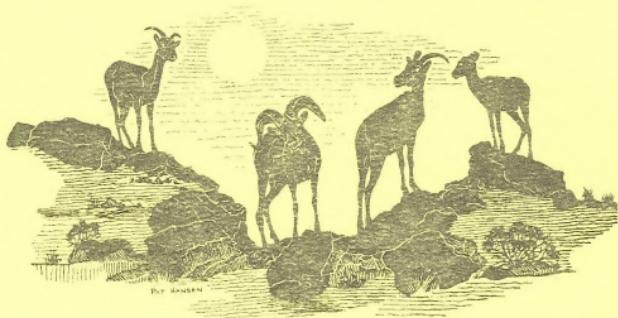




# Potential Bighorn Sheep Habitat In Northern Nevada



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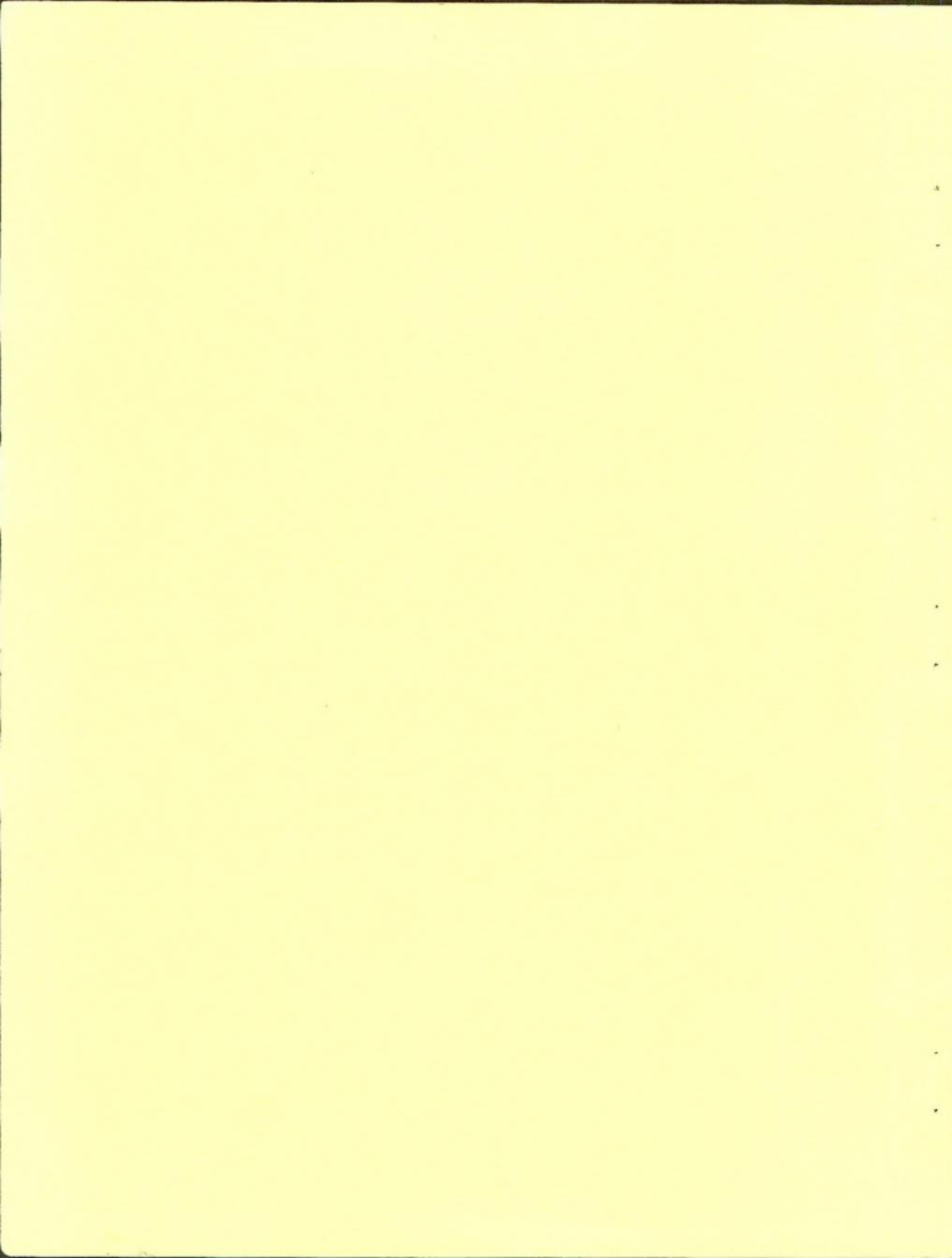
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AND

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Prepared by

Howard Golden

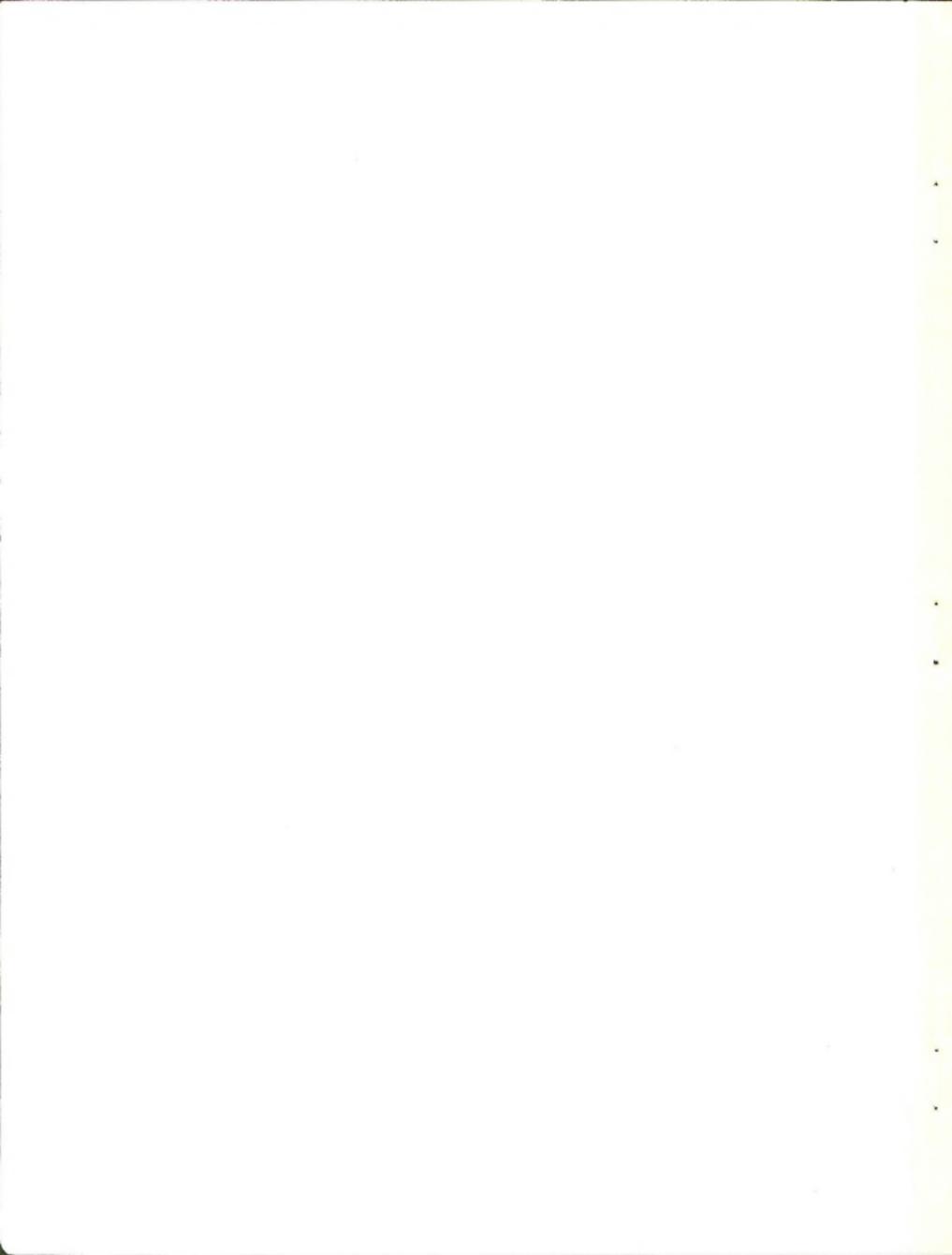
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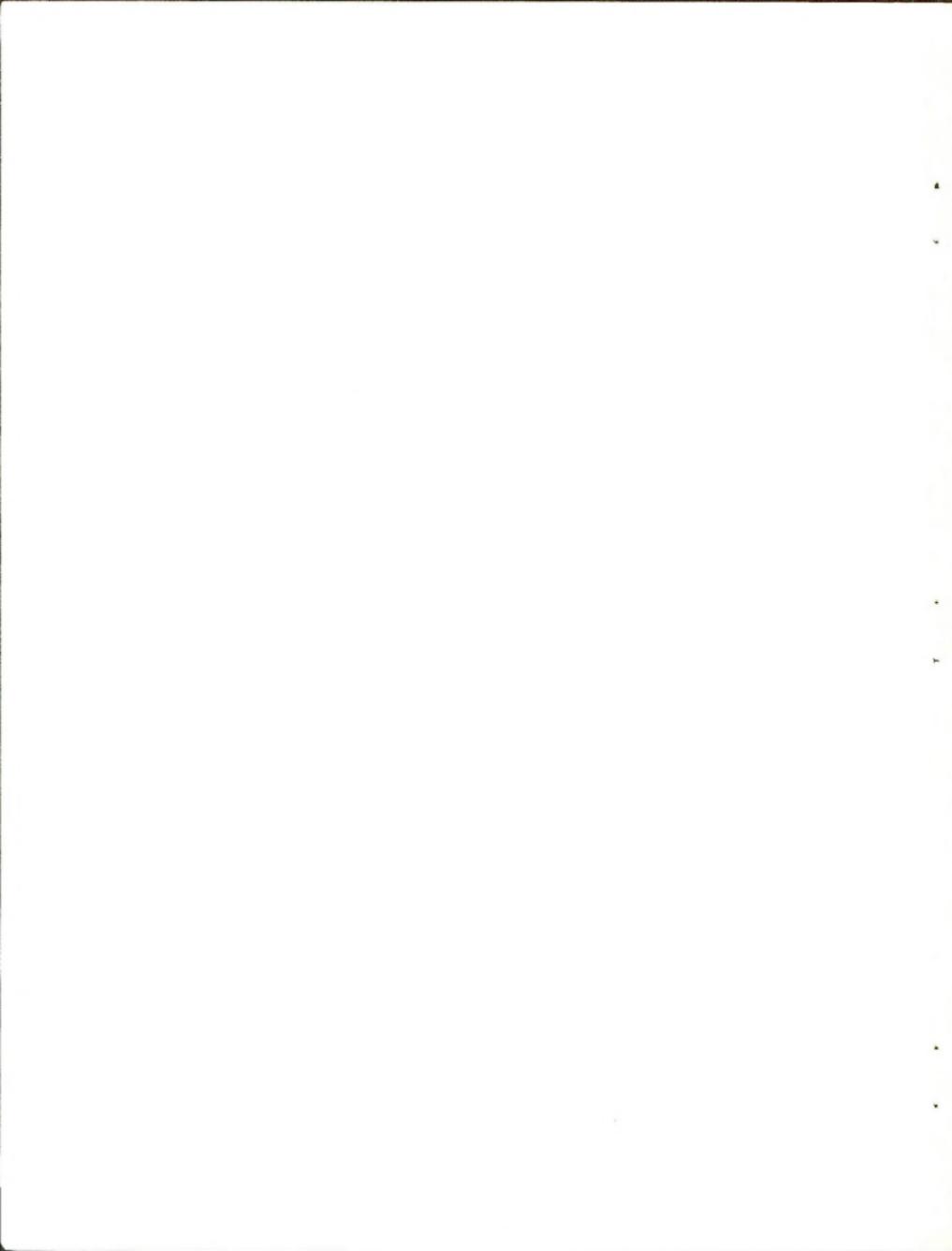
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by the Nevada Department of Wildlife.

MARCH 1980



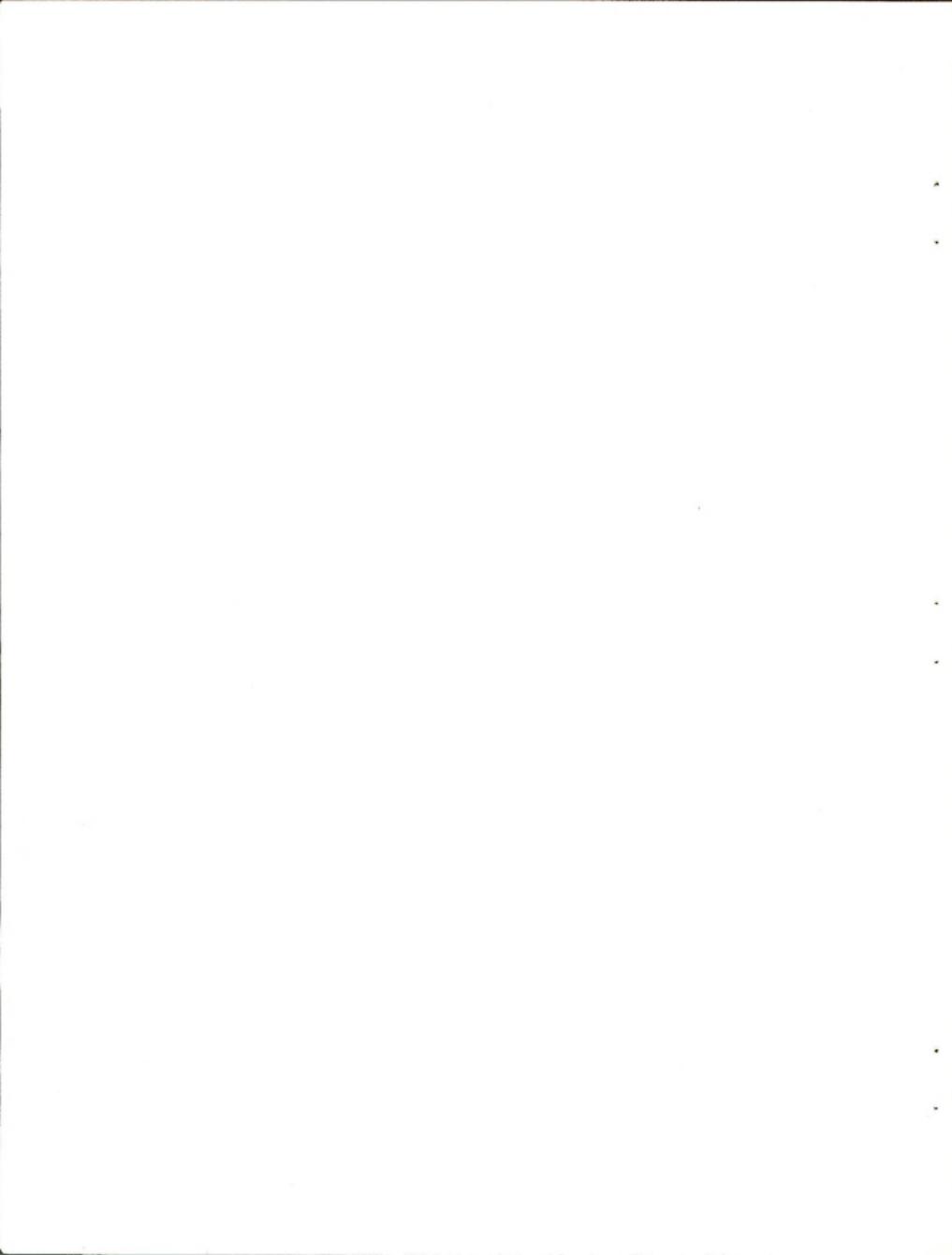
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## INTRODUCTION

### Historical Background

Prior to the appearance of the white man in the west in the early 1800's, most mountain ranges were inhabited by bighorn sheep, Ovis canadensis (Beuchner 1960). This included Nevada which, according to Cowan (1940) and Hall (1946), contained three subspecies of bighorns: Rocky Mountain bighorns (O. c. canadensis), California bighorns (O. c. californiana) and Nelson's bighorns (O. c. nelsoni).

Currently, the desert or Nelson's bighorn is the only relict subspecies that exists in Nevada, and it occurs in the scattered mountain ranges of the southern two-thirds of the state (Tsukamoto 1974). Big-horns are predominantly restricted to areas in Clark and Lincoln Counties, with the majority located on the mountain ranges within the Desert National Wildlife Range. The northern extension of Nelson's bighorn in Nevada is the Toiyabe Range in Nye County (Tsukamoto 1974).

Since 1968, several reintroductions of bighorns have been made in Nevada. Nelson's bighorns were released and seem to have become established in the Stonewall Mountain area of Nye County and the Wassuk of Mineral County. Rocky Mountain bighorns have been reintroduced into the Snake Range in eastern White Pine County, and California bighorn were reintroduced to the Santa Rosa Range of Humboldt County (McQuivey 1978).

The drastic reduction or elimination of bighorns in Nevada was the result of a variety of factors, the most significant of which was "severe overgrazing by and competition for forage with domestic livestock" (McQuivey 1978). The most serious livestock competitors of bighorns are domestic sheep and cattle. Competition for forage between livestock and bighorns continues to limit the latter in central and southern Nevada. In fact, domestic sheep are effective in completely excluding native bighorn sheep anywhere in the State. Horses and burros do not generally overlap with bighorn ranges except in localized areas of Nevada (McQuivey 1978). Other significant factors impacting bighorns in Nevada were overhunting and poaching, intensive mining, ranching, railroad interests, disease and parasite outbreaks such as pneumonia, lungworm and scabies (Beuchner 1960; McQuivey 1978).

### Purpose of this Evaluation

The above problems still exist to some extent with the exception of overhunting which is strictly controlled. It is felt that many ranges in Nevada have not been so severely impacted that they cannot support big-horns now.

This evaluation was designed to obtain preliminary information for determining the suitability of selected mountain ranges in the northern one-third of Nevada as sites in which to reestablish bighorn sheep populations. More specifically, the objectives were:

1. To identify all potential bighorn sheep transplant sites on Public Lands and to evaluate the current habitat conditions for possible introduction of the species.
2. To identify existing conflicts of the area and recommend solutions if any.
3. To prioritize each site based on the accumulated data and preliminary evaluation of the area.

This project is in response to a cooperative agreement between the Bureau of Land Management and the Nevada Department of Wildlife to facilitate the identification and receipt of clearance and authorization on Public Lands for the future.

#### STUDY AREAS

The mountain ranges selected for this evaluation are scattered across northern Nevada (Figure 1) and are predominantly within the Elko, Winnemucca, Carson City, and a small portion of the Susanville Districts of the Bureau of Land Management. These ranges are:

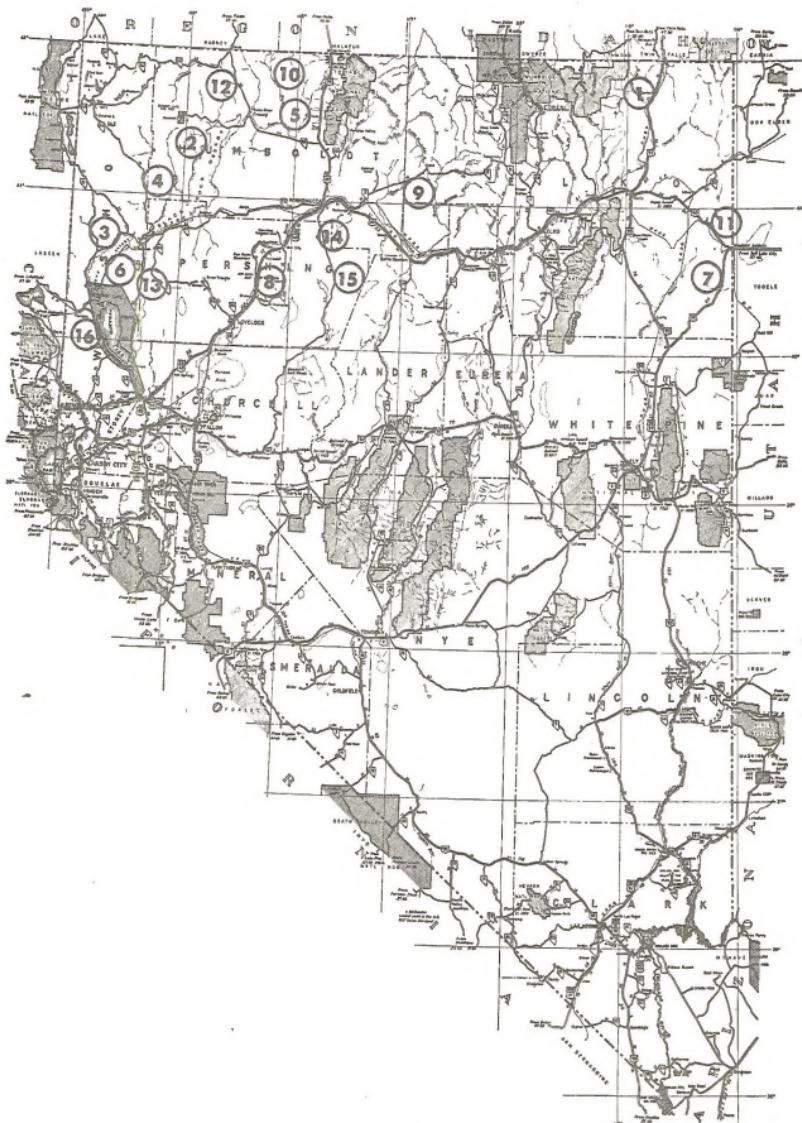
1)	Badlands	9)	Izzenhood Mountains
2)	Black Rock Range	10)	Montana Mountains
3)	Buffalo Hills	11)	Pilot Peak
4)	Calico Mountains	12)	Pine Forest Range
5)	Double H Mountains	13)	Selenite Range
6)	Fox Range	14)	Sonoma Range
7)	Goshute Mountains	15)	Tobin Range
8)	Humboldt Range	16)	Virginia Mountains

The above ranges are characteristic of the physiography present in northern Nevada, as each lies in a north-south direction separated by wide valley or basins. They are fault-block ranges which rise rapidly, sometimes up to 5,000 feet, above the valley floors. The alkali basins comprising most of the intermountain areas in this Great Basin region are the primary recipients of precipitation runoff from the ranges.

Precipitation throughout northern Nevada is erratic and light, averaging eight to ten inches annually. Summer rainfall usually takes the form of thundershowers, while winter normally brings snow, particularly in the higher elevations, and occasional extended periods of light rain. Temperatures often dip well below freezing during winter and may reach over 100° F. during summer.

FIGURE 1

Location of 16 Mountain Ranges Evaluated as Potential Bighorn Sheep Habitat



Vegetation types vary between, and sometimes within, northern Nevada ranges from sagebrush-grass to pinyon-juniper to subalpine-alpine. The former is by far the most common type represented, by the more important species such as sagebrush (Artemesia sp.), bitterbrush (Purshia tridentata), rabbitbrush (Chrysothamnus), Mormon tea (Ephedra), cheatgrass (Bromus tectorum), Nevada bluegrass (Poa nevadensis), Great Basin wildrye (Elymus cinereus), and wheatgrass (Agropyron sp.). In the pinyon-juniper community, Utah juniper (Juniperus osteosperma), pinyon pine (Pinus monophylla), mountain mahogany (Cercocarpus ledifolius), serviceberry (Amelanchier alnifolia) rabbitbrush, are representative components. Subalpine-alpine communities are occasionally found in the highest areas, dominated by bristlecone pine (Pinus aristata), limber pine (Pinus flexilis), and low perennial herbs and grasses.

Northern Nevada ranges contain a variety of wildlife species, which seldom occur in high densities. Those of potential importance to bighorns include mule deer (Odocoileus hemionus), pronghorn antelope (Antilocapra americana), elk (Cervus canadensis) in very limited areas of eastern Nevada, mountain lion (Felis concolor), bobcat (Lynx rufus) and coyote (Canis latrans). Livestock, both domestic and feral, are also found in the ranges and present potential impacts to bighorns. Cattle comprise the largest group of livestock, but domestic sheep and feral horses are numerous in many areas. It is believed that the above-mentioned mountain ranges may have all supported bighorn sheep, as indicated by historical records, Indian petroglyphs, and archeological discoveries of skulls and skeletons.

#### METHODS

Several sites for each range were chosen in advance. Not every preselected site could be surveyed, for various reasons, in which case an alternate site was chosen. This procedure facilitated a complete and hopefully unbiased assessment of the overall potential of each range to support bighorns.

A modification of Hansen's (M.S.) original classification of desert bighorn habitat was used to evaluate each site. However, it was not possible to make a detailed qualitative and quantitative habitat analysis due to time constraints. The following habitat components were examined and assigned values:

1. Topography - Roughness of terrain and general aspect of the range in relation to elevational gradient.
2. Water Availability - Distribution of water sources, amount and permanence of water, topographic location of sources, and animal use of sources.

3. Vegetation - General vegetation type, percentages of preferred forage, overall vegetation density.
4. Animal Use - Domestic/feral utilization, big game utilization.
5. Human Use - Roads and fences, mineral and agricultural development.

Appendix A includes a complete description of the evaluation guide and point-value system used. All habitat components were assessed as objectively and consistently as possible between sites and ranges. Additional notes were made concerning related factors which may have an effect on bighorn reintroductions. These included important topographic features such as rock outcrops, stock tanks near water sources, vegetation species composition and patterns, livestock and big game utilization patterns, and human activities such as road usage and recreation.

Following field investigations, all the habitat-components and sub-components were totaled for all sites examined and weighted by multiplying the value by four and averaged for a weighted-average total. These final weighted-averages were used as a basis for comparison of habitat quality among the ranges. The maximum weighted site-total allowable was 232 points. A breakdown of habitat quality by weighted-points is given below:

Excellent = 180+ points: Vital for bighorns  
Good = 160-179 points: Important for bighorns  
Fair-Good = 130-159 points: Zone of deficiency for bighorns  
Fair = 111-129 points: Buffer zone for bighorns  
Poor-Fair = 81-110 points: Low importance for bighorns  
Poor = -80 points: No importance for bighorns

The areas which were thought to have some potential for bighorn sheep introductions were outline on 1:500,000 scale maps. The square miles of high potential (160+ points) habitat was calculated by planimetering the area for the areas from the prepared maps. Appendix B shows the calculated potential habitat areas for each of the 16 mountain ranges surveyed.

The potential population of sheep that could result from an introduction was estimated for each mountain range. The expected sheep density estimates per square mile of habitat was developed from data gathered by McQuivey (1978), Jones (1950), Honess and Frost (1942) and Kascike (1980). By multiplying the approximate square miles of sheep habitat within the 160+ weighted value areas times the expected density value, an approximation of the expected sheep population was determined (see Appendix C).

The final criteria used to evaluate the mountain ranges visited was the approximate percent of Public Lands within the area surveyed.

Appendix D summarizes the habitat evaluations in priority order as determined by the evaluation process. This information provides a fairly objective system of ranking the ranges for further study and evaluation.

## MOUNTAIN RANCE ANALYSIS

A summary of the important habitat evaluations are pointed-out and discussed for each of the sixteen mountain ranges visited. Some of the significant habitat characteristics are determined and totaled for the numerical rating effort. The task of determining and evaluating some of the more intangible values that help to comprise or detract from potential bighorn sheep habitat was of equal importance.

### BADLANDS

Topographically the Badlands rate only fair. Although the area is very dissected, only those portions along Salmon Falls Creek and the higher mesas consist of extensive steep and rocky terrain, (Figure 2). Water availability is generally good (Table 1) and vegetation composition and density are fair to good throughout. The area is noticeably affected and sometimes seriously impacted by livestock grazing. Impacts to the vegetation from cattle grazing are less definable geographically but there appears to be an overall paucity of preferred grasses and shrubs relative to site potential.

On the basis of this preliminary investigation, and the overall rating of 362.5 points, the Badlands should be considered 10th in priority for intensive evaluation of the 16 sites visited. Of the approximately 69 square-miles investigated as potential bighorn sheep habitat in the Badlands, about 42 percent or 29 square-miles can be classified as good to excellent. This is based on sites with values of 160+ weighted-points and the quality of adjacent habitat (see Appendix B). The overall weighted-average for the eight sites surveyed is 164.0 points, while the six sites in good to excellent habitat average 168.0 weighted-points (see Table 2). The best potential areas lie along Salmon Falls Creek, to the northeast of this area and west of Ella Dee Mountain, and includes the highest and most rugged terrain, (see Figure 3 and 4). For these areas, a subjective estimate of the expected carrying capacity was determined to be three bighorns/square-mile. This estimate would allow for approximately 86 sheep in the best potential areas of the Badlands.

Future study and management of the Badlands regarding bighorn transplants should be focused on the highest potential areas. It is evident from this preliminary investigation that the potential could be higher with improvements in the existing vegetation composition and density.

WELLS



FIGURE 2

## LEGEND

— Overall area surveyed  
 - - - Area with  $\geq 160$  weighted points  
 O Site surveyed

BADLANDS



FIGURE 3. Dissected mesa-type terrain and rolling hills.  
Area North of Salmon Falls Creek.



FIGURE 4. Steep and rocky slopes mixed with rolling hills.  
Devil Creek Area.

TABLE 1. POTENTIALLY IMPORTANT WATER SOURCES IN THE BADLANDS.

WATER SOURCE	KNOWN STATUS	LOCATION
*Scott Creek Spring	Always present - open flow	T.45N., R.63E., Sec. 6
Unnamed Spring		T.45N., R.63E., Sec. 18
Unnamed Spring		T.45N., R.63E., Sec. 19
Unnamed Spring		T.45N., R.62E., Sec. 25
*Monkey Creek	Always present - open flow	T.45N., R.62E., Sec. 26
*Scott Creek	Always present - open flow	T.45N., R.62E., Sec. 14, 11
Unnamed Creek		T.45N., R.62E., Sec. 15, 10, 2
*Devil Creek	Always present - open flow	T.44N., R.62E., Sec. 35, 2, 3, 11
*Unnamed Springs	Always present - open flow	T.44N., R.62E., Sec. 4
Unnamed Spring		T.45N., R.62E., Sec. 33
Lee Spring		T.44N., R.62E., Sec. 9
Wrist Spring		T.44N., R.62E., Sec. 9
Hillside Spring		T.44N., R.62E., Sec. 9, 16
*Unnamed Spring	Always present - open flow	T.44N., R.62E., Sec. 16
Unnamed Spring		T.44N., R.62E., Sec. 21
Unnamed Spring		T.44N., R.62E., Sec. 28
*Unnamed Spring	Always present - open flow	T.44N., R.62E., Sec. 27, 28
Unnamed Springs		T.44N., R.62E., Sec. 29
Unnamed Springs		T.44N., R.62E., Sec. 33
Unnamed Springs		T.44N., R.62E., Sec. 34

\*Observed water sources

TABLE 2. BADLANDS, HABITAT SITE EVALUATION.

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SITE	TOPOGRAPHY	WATER AVAILABILITY				VEGETATION			ANIMAL USE		HUMAN USE		TOTAL (TOTAL X 4)		
		A	B	C	D	A	B	C	A	B	A	B			
1	3 b&c	5	5	3	1	4	3	3	1	3	3	5	39	156	
2	3 b&c	5	5	3	1	4	4	3	1	3	3	5	40	160	
3	4	5	5	4	2	4	2	2	3	3	4	5	43	172	
4	4	5	5	4	2	4	3	2	2	3	4	5	43	172	
5	4	5	5	5	2	4	2	3	2	3	4	5	44	176	
6	3 b	5	5	3	1	4	3	3	2	4	3	5	41	164	
7	3 b	5	5	3	1	4	3	2	2	4	4	5	41	164	
8	2	5	4	2	1	4	2	2	2	4	4	5	37	148	
TOTAL		26	40	39	27	11	32	22	20	15	27	29	40	328	1,312
AVERAGE		3.3	5.0	4.9	3.4	1.4	4.0	2.8	2.5	1.9	3.4	3.6	5.0	41.0	
WEIGHTED-AVERAGE (TOTAL X 4/N)															
		13.0	20.0	19.5	13.5	5.5	16.0	11.0	10.0	7.5	13.5	14.5	20.0	164.0	

NOTE: See Appendix A for explanation of values.

### BLACK ROCK RANGE

Nearly all of the area investigated is in Public Lands. Overall, the topography of the Black Rock's is fair for bighorns, with the steepest and most rugged terrain limited to the narrow portion along the northwest and western sides of the range (Figure 5). Water availability is fair to good (Table 3) and vegetation composition and density are poor to fair. Both of these habitat components are also greatly impacted by cattle and horse utilization.

On the basis of this preliminary analysis the Black Rock Range should be considered only marginal habitat for bighorn sheep in its present condition. Of the approximately 65 square-miles investigated as potential bighorn habitat about 29 percent or 19 square-miles can be classified as good to excellent. This is based on sites with values of 160+ weighted-points and the quality of adjacent habitat (see Appendix B). The overall weighted-average for the ten sites surveyed is 154.4 points, while the three sites in good to excellent habitat average 172.0 weighted-points (see Table 4). The best potential area lies in the northwest portion of the range (see Figure 6 and 7). For this area, a subjective estimate of the expected carrying capacity was determined to be 3.5 bighorns/square-mile. This estimate would allow for approximately 67 sheep in the Black Rock Range, not considering areas with less than 160 weighted-points (see Appendix C).

Future study and management of the Black Rock's should be concentrated not only on the area described above, but also on the areas around Pahute Peak and along the western side of the range. The former area has the best potential for supporting a sizable population of bighorns, but the others might have better potential providing certain improvements are made. The entire range would benefit greatly from a large reduction in the number of cattle and horses. The southern two-thirds of the range, in particular, needs additional efforts in improving vegetation composition and density and water developments.

The Black Rock Range was once occupied by bighorns. Recent findings of skull fragments and horn sheaths attest to their presence in the historical past. The area remains as a potential for reintroduction, however, some land management action must be incurred before success of such action could be assured.

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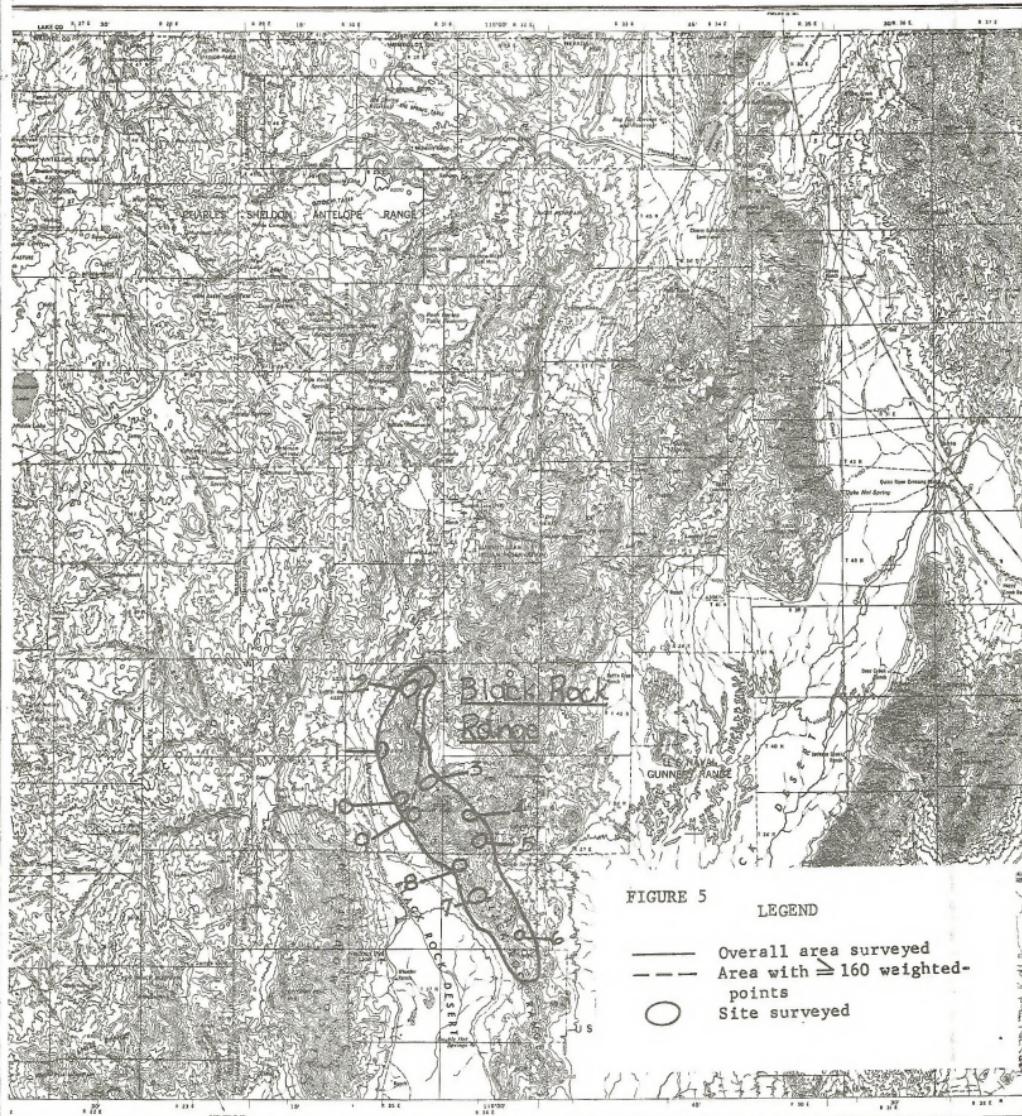


FIGURE 5

## LEGEND

- Overall area surveyed
- - - Area with  $\geq 160$  weighted-points
- Site surveyed

BLACK ROCK RANGE



FIGURE 6. Steep and rocky terrain broken by canyons and rolling hills. Area northwest of Pahute Peak.



FIGURE 7. Rolling-hill terrain broken by broad canyons and near steep and rocky terrain. High northern area.

TABLE 3. POTENTIALLY IMPORTANT WATER SOURCES IN THE BLACK ROCK RANGE.

WATER SOURCE	KNOWN STATUS	LOCATION
*Mustang Springs	Seldom dry - open seep	T.40N., R.25E.
*Unnamed Springs	Often dry during dry summers	T.40N., R.25E.
Copper Canyon Springs		T.39N., R.25E.
*Unnamed Springs	Often dry during dry summers	T.39N., R.25E.
Big Mountain Spring		T.39N., R.26E., Sec. 17
*Indian Creek Springs	Often dry during dry summers	T.39N., R.26E., Sec. 19, 20, 21, 28
*Unnamed Spring	Often dry during dry summers	T.39N., R.26E., Sec. 17
*Unnamed Spring	Often dry during dry summers	T.39N., R.26E., Sec. 28
Unnamed Spring		T.39N., R.26E., Sec. 32, 33
*Unnamed Springs	Often dry during dry summers	T.38N., R.26E.
Unnamed Springs		T.37N., R.26E.

\*Observed water sources

TABLE 4. BLACK ROCK RANGE, HABITAT SITE EVALUATION.

SITE	TOPO-GRAPHY	WATER AVAILABILITY				VEGETATION			ANIMAL USE		HUMAN USE		TOTAL (TOTAL X 4)		
		A	B	C	D	A	B	C	A	B	A	B			
1	4	5	3	5	2	4	3	2	2	4	5	5	44	176	
2	4	5	4	5	2	4	3	3	2	3	5	5	45	180	
3	3 b&c	5	3	3	1	4	2	2	1	3	5	5	37	148	
4	3 b	5	3	4	1	4	2	2	1	3	5	5	38	152	
5	3 b	5	3	4	1	4	1	1	1	3	5	5	36	144	
6	3 b	4	3	3	1	4	1	1	1	3	5	5	34	136	
7	4	4	3	4	1	4	1	1	2	3	5	5	37	148	
8	4	4	3	4	1	4	1	1	2	3	5	5	37	148	
9	4	5	3	4	1	4	1	1	2	3	5	5	38	152	
10	4	4	3	4	1	4	3	2	2	3	5	5	40	160	
TOTAL		36	46	31	40	12	40	18	16	16	31	50	50	386	1,544
AVERAGE		3.6	4.6	3.1	4.0	1.2	4.0	1.8	1.6	1.6	3.1	5.0	5.0	38.6	
WEIGHTED-AVERAGE (TOTAL X 4/N)		14.4	18.4	12.4	16.0	4.8	16.0	7.2	6.4	6.4	12.4	20.0	20.0	154.4	

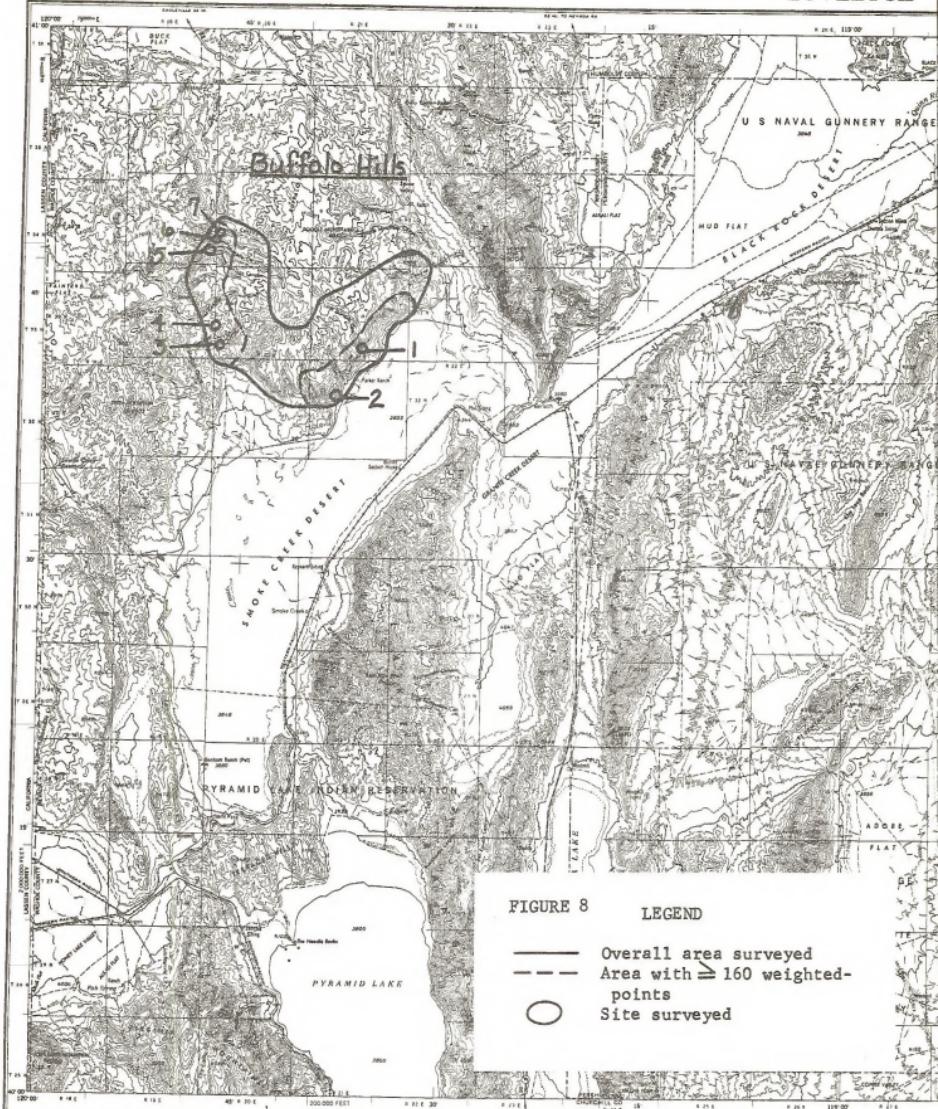
NOTE: See Appendix A for explanation of values.

### BUFFALO HILLS

The topography of the Buffalo Hills is considered only fair for bighorn sheep, with most of the area characterized by rolling hills or mesa-type terrain (Figure 8). The most rugged terrain observed was in the vicinity of Little Sawmill Canyon on the southeast side. Water availability is generally good (Table 5) and vegetation composition and density are fair to good. Both of these habitat components show signs of recent and severe overutilization by livestock. Cattle grazing has been discontinued in the area of investigation, and this should produce positive range responses. There was some current impact noted from horses with the heaviest use observed in the southern and southeastern portion of the range. Deer presence is light to moderate and human presence is light over the entire area. Neither should present any serious problem to transplanted bighorns.

On the basis of this preliminary investigation, the Buffalo Hills should be considered fair habitat for bighorn sheep. Of the approximately 101 square-miles investigated as potential bighorn sheep habitat in the Buffalo Hills, about 37 percent or 37 square-miles can be classified as good to excellent. This is based on sites with values of 160+ weighted-points and the quality of adjacent habitat (see Appendix B). The overall weighted-average for the seven sites surveyed is 166.9 points, and all of these sites were in good to excellent habitat (see Table 6). The best potential areas lie along the extreme western and southeastern sides of the investigated area (see Figure 9 and 10). For these areas, a subjective estimate of the expected carrying capacity was determined to be three bighorns/square-mile. This estimate would allow for approximately 112 sheep in the Buffalo Hills, not considering areas with less than 160 weighted-points (see Appendix C).

Future study and management of the Buffalo Hills should be focused on the above areas as well as their upper drainages. These upper but less rugged areas may provide good summer range for bighorns, particularly if cattle numbers are kept at realistic levels. Horse numbers should also be reduced to lessen any competition to bighorn sheep for important water sources and forage. Any habitat improvements will obviously result in considerable benefits to the potential for successful bighorn introduction.



BUFFALO HILLS

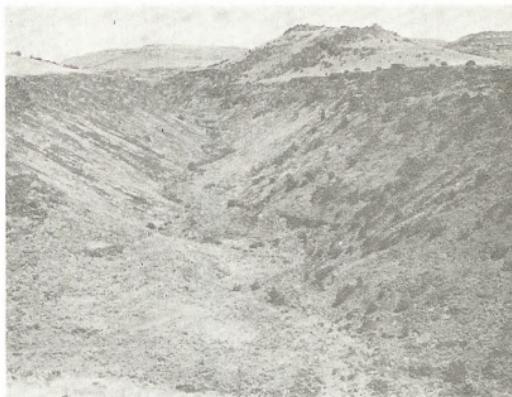


FIGURE 9. Rolling hills and mesa-type terrain broken by broad canyons and near steep and rocky terrain. Tin Canyon Area.

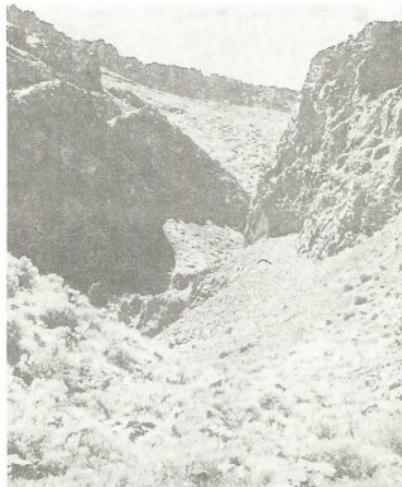


FIGURE 10. Very steep and rocky canyon with large outcrops and sharp cliffs below the mesa tops. Little Sawmill Canyon.

TABLE 5. POTENTIALLY IMPORTANT WATER SOURCES IN THE BUFFALO HILLS.

WATER SOURCE	KNOWN STATUS	LOCATION
Table Spring		T.33N., R.21E.
*Little Sawmill Canyon Creek	Always present - intermittent pooling	T.33N., R.21E.
Parker Spring		T.33N., R.21E.
Middle Canyon Spring		T.33N., R.21E.
*Company Spring	Seldom dry - seep	T.33N., R.21E.
*Cottonwood Spring	Always present - open flow	T.32N., R.21E.
Little Spring		T.32N., R.20E.
*rosebush Spring	Always present - open flow	T.33N., R.20E.
*Crooked Canyon Spring	Seldom dry - seep	T.33N., R.20E.
*Cow Spring	Always present - open flow	T.33N., R.19E.
Tule Spring		T.33N., R.19E.
*Trail Canyon Spring	Seldom dry - seep	T.33N., R.20E.
*Twin Springs	Seldom dry - seep	T.33N., R.20E.
*Cottonwood Spring	Seldom dry - seep	T.34N., R.20E.
Tin Spring		T.34N., R.20E.
*Black Mountain Spring	Always present - open flow	T.34N., R.20E.

\*Observed water sources

TABLE 6. BUFFALO HILLS, HABITAT SITE EVALUATION.

10-20

SITE	TOPO-GRAPHY	WATER AVAILABILITY				VEGETATION			ANIMAL USE		HUMAN USE		TOTAL (TOTAL X 4)
		A	B	C	D	A	B	C	A	B	A	B	
1	5	4	5	4	3	4	3	3	2	2	5	5	45 180
2	3 b	4	5	3	2	4	4	3	1	3	5	5	42 168
3	3 b	5	5	3	2	3	3	3	2	2	5	5	41 164
4	3 b	4	4	4	3	3	2	3	2	2	5	5	40 160
5	3 b&c	4	4	3	2	3	2	3	3	3	5	5	40 160
6	3 b&c	4	4	3	2	3	2	3	3	3	5	5	40 160
7	3 b&c	5	5	4	3	3	2	3	3	3	5	5	44 176
TOTAL		23	30	32	24	17	23	18	21	16	18	35	35 292 1,168
AVERAGE		3.3	4.3	4.6	3.4	2.4	3.3	2.6	3.0	2.3	2.6	5.0	5.0 41.7
WEIGHTED-AVERAGE (TOTAL X 4/N)													
13.2 17.2 18.3 13.7 9.7 13.1 10.3 12.0 9.1 10.3 20.0 20.0 166.9													

NOTE: See Appendix A for explanation of values.

#### CALICO MOUNTAINS

The Calico Mountains are primarily Public Lands administered by the Bureau of Land Management. Topographically the Calico's are good to excellent for bighorns, with most of the area providing adequate escape terrain. The most rugged areas are located around and southeast of Donnelly Peak (Figure 11). Water availability is fair (Table 7) and vegetation composition and density are fair to poor across the range. Poorest areas for both habitat components seem to be located on the northern and southern extremes of the range. Cattle and horse presence in the range appears to have greatly impacted the water and vegetation resources that would be important for bighorns. Overgrazed grasses and shrubs show obvious signs of abuse near water sources and are evidence that this is an accurate conclusion.

In considering all components of this habitat evaluation, the Calico Mountains should be considered poor, for reintroduction of bighorn sheep at the present time. Of the approximately 143 square-miles investigated as potential bighorn habitat, about 20 percent or 28 square-miles can be classified as good. This is based on sites with values of 160+ weighted-points and the quality of adjacent habitat (see Appendix B). The overall weighted-average for the nine sites surveyed is 156.0 points, while the three sites in good habitat average 165.3 weighted-points (see Table 8). The area with the best potential is the central high terrain of the range, north and southeast of Donnelly Peak (see Figure 12 and 13). A subjective estimate of the expected carrying capacity for this area was determined to be 2.5 bighorns/square mile. This estimate would allow for approximately 71 sheep in the Calico's, not considering areas with less than 160 weighted-points (see Appendix C).

Studies and management efforts in the future will need to focus on the impacts of livestock, primarily, and on improving the composition and density of the vegetation in general. Other than the limited good habitat presently available the Calico's face serious shortcomings in their ability to support a substantial and viable population of bighorns unless improvements are made. It is apparent that large numbers of cattle and horses must be removed and that more compatible grazing practices must be enacted. Because most of the observed water sources appeared to be questionable on a yearlong basis, it should be beneficial to construct bighorn water tanks in several locations in the more rugged terrain.

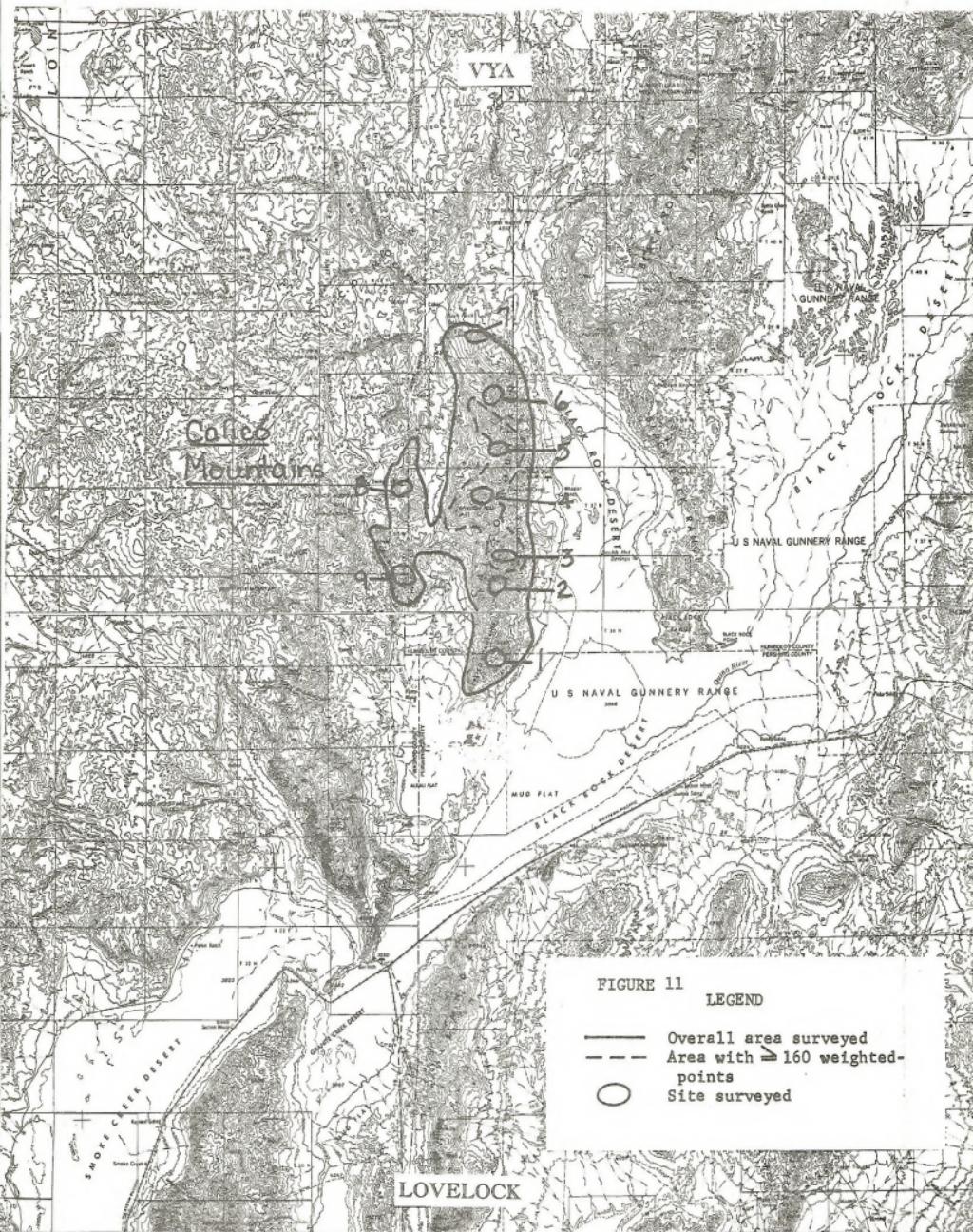


FIGURE 11  
LEGEND

— Overall area surveyed  
- - - Area with  $\geq 160$  weighted-points  
○ Site surveyed

CALICO MOUNTAINS

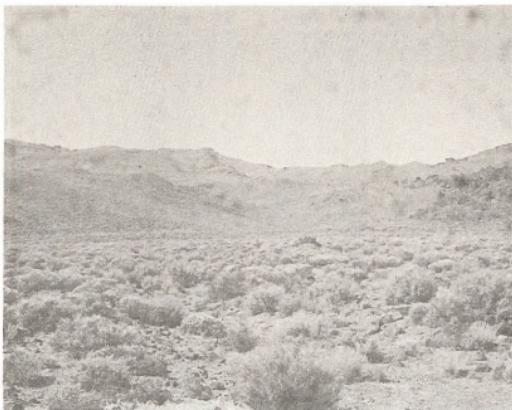


FIGURE 12. Steep and rocky terrain broken frequently by canyons and rolling hills. High Southern Area.



FIGURE 13. Steep and rocky terrain with canyons and some rolling hills above. Willow Creek Area.

TABLE 7. POTENTIALLY IMPORTANT WATER SOURCES IN THE CALICO MOUNTAINS.

WATER SOURCE	KNOWN STATUS	LOCATION
*Willow Creek	Often dry during dry summers	T.39N., R.24E., Sec. 22
*Unnamed Springs	May be dry during summers	T.38N., R.24E.
*Unnamed Springs	May be dry during summers	T.37N., R.23E.
*Donnelly Spring	Always present - open seep	T.38N., R.23E.
Buck Spring		T.37N., R.24E.
*Unnamed Springs	May be dry during dry summers	T.37N., R.24E.
*Unnamed Springs	Very irregular - usually winter	T.36N., R.25E.
		T.35N., R.24E.

\*Observed water sources

TABLE 8. CALICO RANGE, HABITAT SITE EVALUATION.

-25-

SITE	TOPOGRAPHY	WATER AVAILABILITY				VEGETATION			ANIMAL USE		HUMAN USE		TOTAL (TOTAL X 4)		
		A	B	C	D	A	B	C	A	B	A	B			
1	4	4	1	4	2	4	2	1	2	3	5	5	37	148	
2	4	4	2	4	2	4	2	2	2	3	5	5	39	156	
3	5	5	3	5	2	4	2	2	2	3	5	5	43	172	
4	4	5	5	4	1	4	2	2	1	3	5	5	41	164	
5	4	5	4	4	1	4	2	2	1	3	5	5	40	160	
6	4	5	3	4	1	4	2	2	1	3	5	5	39	156	
7	4	4	2	5	2	4	2	1	1	3	5	5	38	152	
8	4	4	3	4	1	4	2	2	1	3	5	5	38	152	
9	3 b	4	3	3	1	4	2	2	1	3	5	5	36	144	
TOTALS		36	40	26	37	13	36	18	16	12	27	45	45	351	1,404
AVERAGES		4.0	4.4	2.9	4.1	1.4	4.0	2.0	1.8	1.3	3.0	5.0	5.0	39.0	
WEIGHTED-AVERAGE (TOTAL X 4/N)		16.0	17.8	11.6	16.4	5.8	16.0	8.0	7.2	5.2	12.0	20.0	20.0	156.0	

NOTE: See Appendix A for explanation of values.

#### DOUBLE H MOUNTAINS

The land status of the Double H Mountains is favorable to a bighorn introduction since it is all Public Lands. The topography is fair with the best terrain located along the relatively narrow west escarpment and midrange along the east facing slopes (Figure 15 and 16). Water availability is fair to good (Table 9) and forage composition and density are fair to poor over most of the range. Both habitat components have been abused by livestock. Because of the small area of this range, the above situation is serious and may effect this first impression. The Double H Mountain data evaluation shows the area to be a poor potential release site. Only about 18% of the total area analyzed is considered good habitat in its present condition. These are sights which scored 160+ weighted points (see Table 10). A subjective estimate of the expected carrying capacity for this area was determined to be 2.5 bighorn/square mile. This estimate would only allow for approximately 18 sheep not considering areas with less than 160 weighted points (see Appendix C). Although the results of the preliminary evaluation showed the Double H Mountains to be deficient in several areas, mainly the topography, vegetation and overall size of the area, consideration should be given, however, for reexamination of the topographic values of the eastern side of the range before any final decisions are made concerning the areas as a potential bighorn transplant site.

Figure 14 delineates approximately 41 square miles of potential habitat of which only 7 square miles are presently considered good. The improvement of vegetation quality and quantity could conceivably increase the good habitat classification of approximately 80% of the area or 33 square miles. The resultant evaluation score would be significantly higher. The site has additional positive characteristics that may influence future land management decisions. The area is relatively isolated and is a very compact unit which will facilitate management. In addition there are only two livestock permittees using the area at the present time.

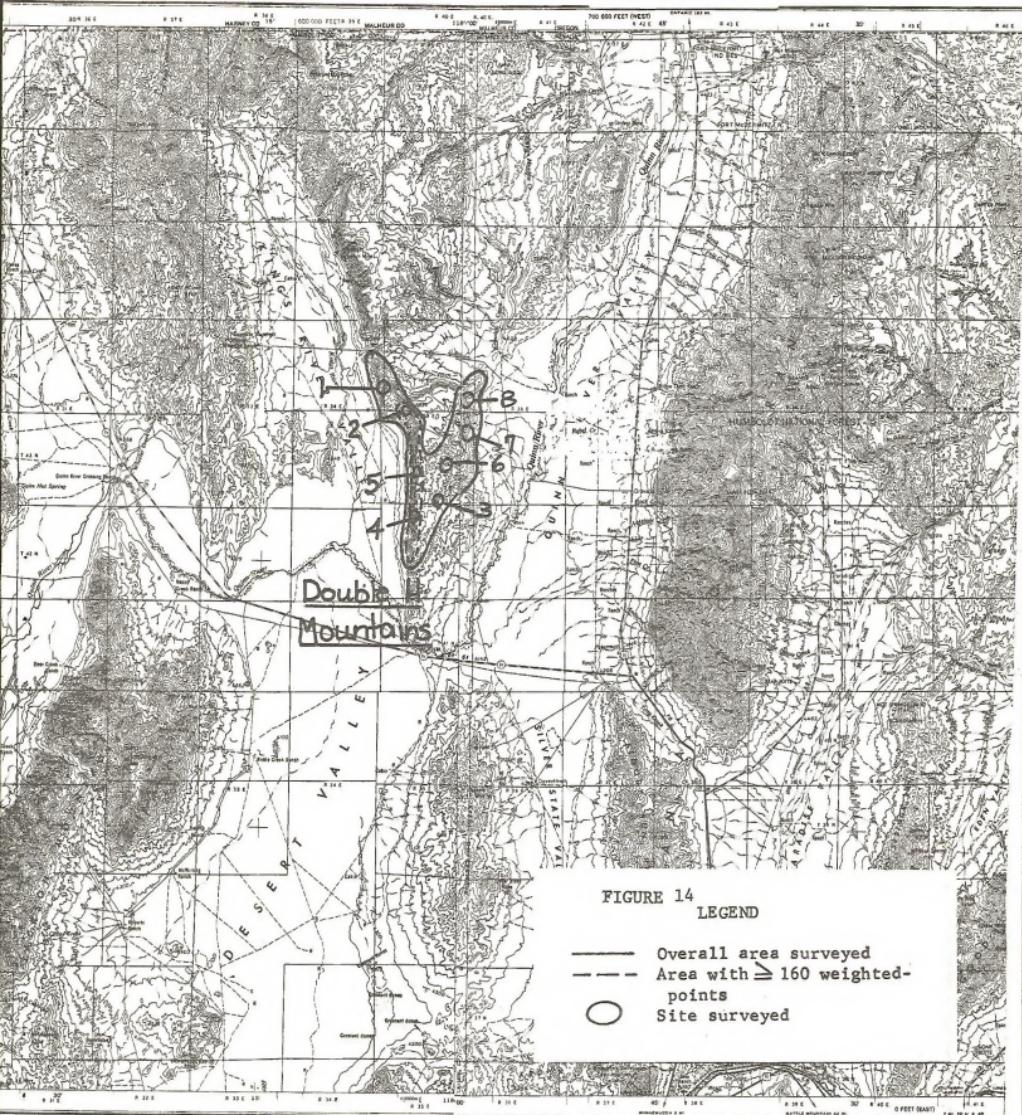


FIGURE 14  
LEGEND

— Overall area surveyed  
 - - - Area with  $\geq 160$  weighted points  
 ○ Site surveyed

DOUBLE H MOUNTAINS

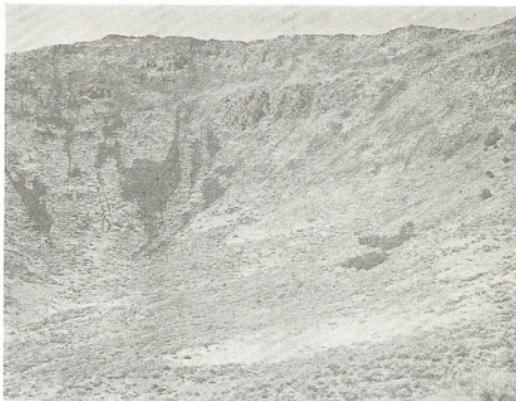


FIGURE 15. Steep and rocky terrain. Along the northwestern escarpment.



FIGURE 16. Rolling hills broken by canyons and near rugged terrain - northeastern area.

TABLE 9. POTENTIALLY IMPORTANT WATER SOURCES IN THE DOUBLE H MOUNTAINS.

WATER SOURCE	KNOWN STATUS	LOCATION
Unnamed Spring		T.44N., R.35E., Sec. 31
*Unnamed Spring	Always present - open seep	T.44N., R.35E., Sec. 32
*Unnamed Spring	Always present - open seep	T.43N., R.35E., Sec. 5
Unnamed Spring		T.43N., R.35E., Sec. 4
Unnamed Spring		T.43N., R.35E., Sec. 8
Unnamed Spring		T.43N., R.35E., Sec. 16
*Unnamed Spring	Always present - open seep	T.43N., R.35E., Sec. 20
Unnamed Spring		T.43N., R.35E., Sec. 28 & 29
Unnamed Spring		T.43N., R.35E., Sec. 32
*Unnamed Spring	Always present - open seep	T.42N., R.35E., Sec. 4 & 5
*Middle Spring	Always present - open seep	T.42N., R.35E., Sec. 3
Unnamed Spring		T.42N., R.35E., Sec. 16 & 17
Unnamed Spring		T.42N., R.35E., Sec. 20
*Pretty Creek	Always present - open seep	T.43N., R.35E., Sec. 12
*Unnamed Spring	Always present - open seep	T.44N., R.35E., Sec. 36

\*Observed water sources

TABLE 10. DOUBLE H RANGE HABITAT SITE EVALUATION.

SITE	TOPO-GRAPHY	WATER AVAILABILITY				VEGETATION			ANIMAL USE		HUMAN USE		TOTAL (TOTAL X 4)	WEIGHT- ED TOTAL
		A	B	C	D	A	B	C	A	B	A	B		
1	3 b	3	2	5	2	4	2	2	3	3	4	5	38	152
2	4	5	5	4	2	4	2	3	2	3	4	5	43	172
3	3 b	5	5	3	1	4	1	2	1	3	4	5	37	148
4	4	5	5	3	1	4	3	2	1	3	4	5	40	160
5	4	5	5	3	1	4	3	2	1	3	4	5	40	160
6	3 b	5	5	3	1	4	3	2	1	3	4	5	39	156
7	3 b	5	5	3	1	4	2	2	1	3	4	5	38	152
8	3 b	5	5	4	1	4	2	2	1	3	4	5	39	156
TOTAL		27	38	37	28	10	32	18	17	11	24	32	314	1,252
AVERAGE		3.4	4.8	4.6	3.5	1.3	4.0	2.3	2.1	1.4	3.0	4.0	5.0	39.3
WEIGHTED-AVERAGE (TOTAL X 4/N)														
13.5	19.0	18.5	14.0	5.0	16.0	9.0	8.5	5.5	12.0	16.0	20.0	157.0		

NOTE: See Appendix A for explanation of values.

#### FOX RANGE

The majority of the Fox Range is within Public Lands, however, a significant portion or the southern extreme is located on the Pyramid Lake Indian Reservation (Figure 17). The best topographic features are located near Pah Rum Peak and along the northwest slope of the Range (Figure 18 and 19). Water distribution is fair to good (Table 11). Vegetative composition and density are only fair to poor. Both the vegetation and water suffer at the present time from excessive adverse impacts of cattle and horses. Big game presence and human activity is generally light.

The present condition of the Fox Range indicates the area is far below site potential. It is considered poor habitat for bighorns at the present time. Only about 31 percent of the 140 square miles investigated is considered good potential. This is based on sites with values of 160+ weighted-points and the quality of adjacent habitat (see Appendix B). The overall weighted-average for the 10 sites surveyed is 152.4 points, while the 4 sites considered in good habitat averaged 165.0 points, (see Table 12). A subjective estimate of the expected carrying capacity was determined to be 2.5 bighorns/square mile. This estimate would allow for approximately 110 sheep, not considering areas with less than 160 weighted-points (see Appendix C).

Perhaps the greatest habitat deficiency for this area is the very poor condition of the Range. The Fox Range recorded the lowest overall vegetative value of the 16 areas investigated.

LOVELOCK

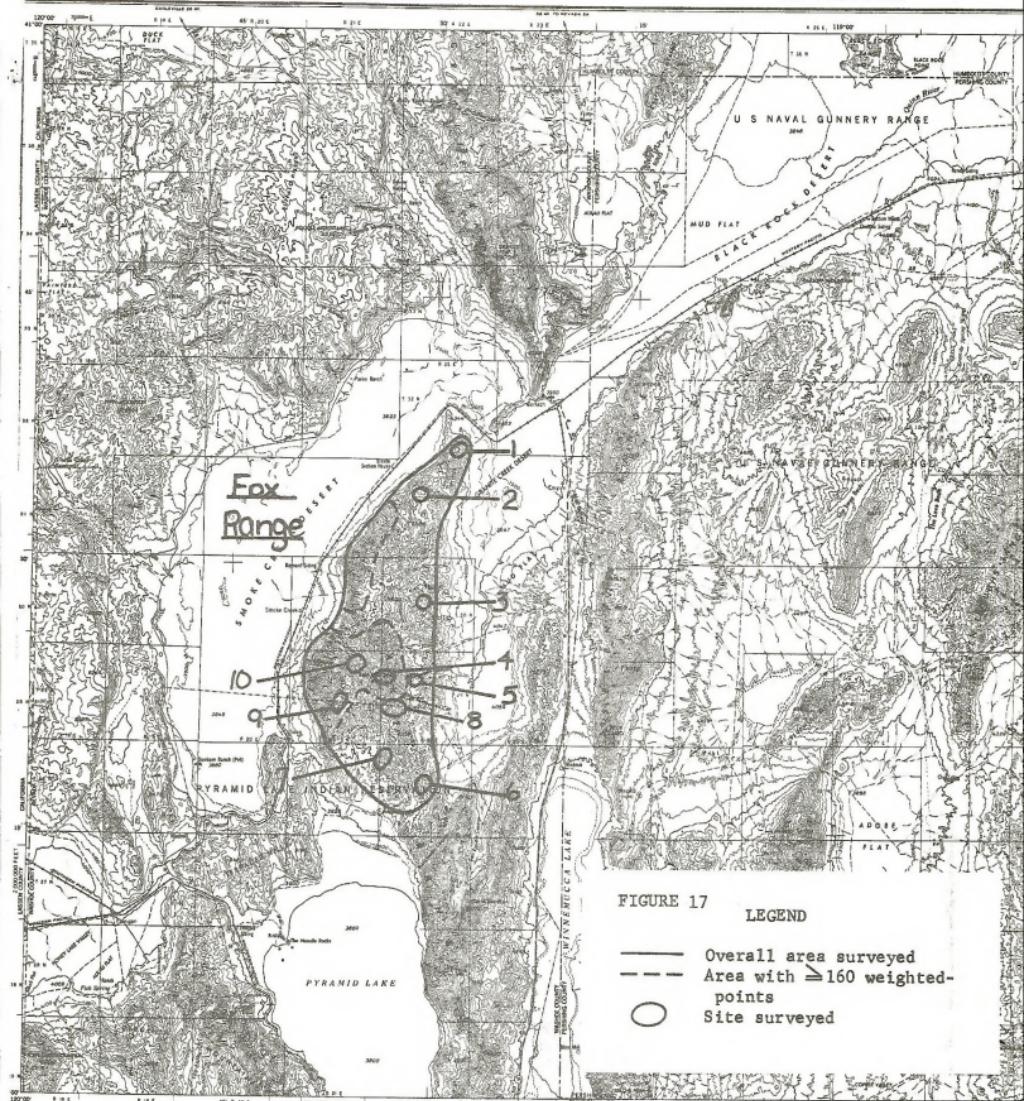


FIGURE 17

LEGEND

FOX RANGE



FIGURE 18. Steep and rocky terrain broken by canyons of varying widths.  
Pah Rum Peak Areas.



FIGURE 19. Rolling-hill terrain broken by broad canyons.  
Buckbrush Spring Area.

TABLE 11. POTENTIALLY IMPORTANT WATER SOURCES IN THE FOX RANGE.

WATER SOURCE	KNOWN STATUS	LOCATION
*Unnamed Springs	May be dry during dry summers	T.32N., R.22E.
Unnamed Springs		T.31N., R.22E.
*Cottonwood Creek	May be dry during dry summers	T.31N., R.22E.
Willow Creek		T.30N., R.22E., Sec. 2, 3, 4, 5, 6, 8, 9, 15
Coyote Creek		T.30N., R.22E., Sec. 16, 17, 18
*Unnamed Springs	May be dry during dry summers	T.30N., R.22E., Sec. 15, 18
Juniper Flat Spring		T.30N., R.21E., Sec. 14
Mud Trough Spring		T.30N., R.21E., Sec. 24
Lost Creek		T.30N., R.21E., Sec. 22, 26, 27, 35, 36
Lost Creek Spring		T.30N., R.21E., Sec. 22
Bull Basin Spring		T.30N., R.22E., Sec. 19
Bull Creek		T.30N., R.22E., Sec. 20, 21, 27, 28
Unnamed Springs		T.30N., R.22E., Sec. 21, 22
Rodeo Creek		T.30N., R.22E., Sec. 31, 32, 33, 34
Unnamed Springs		T.29N., R.22E., Sec. 5, 6
*Rattlesnake Canyon Creek	Always present - open flow	T.29N., R.22E., Sec. 7, 8, 9, 10
*Rattlesnake Canyon Springs	Always present - open seep	T.29N., R.22E., Sec. 7, 8
*Wild Horse Canyon Creek	Always present - open flow	T.30N., R.21E., Sec. 33, 34
*Wild Horse Canyon Springs	Always present - open seep	T.29N., R.21E., Sec. 2, 3, 11
Pole Canyon Creek		T.29N., R.21E., Sec. 4, 5
Rough Canyon Creek		T.29N., R.21E., Sec. 8, 9
*Mullens Canyons Creek	May be dry during dry summers	T.29N., R.21E., Sec. 21, 22
Fox Canyon Springs		T.29N., R.21E., Sec. 23, 24, 34, 35
*Buckbrush Springs	May be dry during dry summers	T.28N., R.21E., Sec. 2
Trail Canyon Creek		T.28N., R.21E., Sec. 1, 12
*Summit Springs		T.28N., R.22E., Sec. 6, 7
*Sheep Pass Springs	Always present - open seep	T.29N., R.22E., Sec. 17, 18, 20, 21
*Sheep Pass Creek	Often dry during dry summers	T.29N., R.22E., Sec. 19, 29, 30
	Often dry during dry summers	T.28N., R.22E., Sec. 9
		T.28N., R.22E., Sec. 9, 16, 21

\*Observed water sources

TABLE 12. FOX RANGE, HABITAT SITE EVALUATION.

SITE	TOPO-GRAPHY	WATER AVAILABILITY				VEGETATION			ANIMAL USE		HUMAN USE		TOTAL (TOTAL X 4)	WEIGHT- ED TOTAL	
		A	B	C	D	A	B	C	A	B	A	B			
1	4	5	3	4	1	4	2	1	2	3	4	5	38	152	
2	3 b	5	3	3	1	4	2	1	1	3	3	3	32	128	
3	3 b	5	3	3	1	4	2	2	1	3	5	5	37	148	
4	5	5	5	5	1	4	2	2	1	3	5	5	43	172	
5	4	5	5	4	1	4	2	2	1	3	5	5	41	164	
6	3 b	5	2	3	1	4	1	2	1	3	5	5	35	140	
7	3 b	5	3	3	1	4	1	2	1	3	5	5	36	144	
8	3 b	5	5	2	1	4	2	2	1	3	5	5	38	152	
9	5	5	3	4	1	4	2	2	1	3	5	5	40	160	
10	4	5	5	4	1	4	2	3	1	3	4	5	41	164	
TOTAL		37	50	37	35	10	40	18	19	11	30	46	48	381	1,375
AVERAGE		3.7	5.0	3.7	3.5	1.0	4.0	1.8	1.9	1.1	3.0	4.6	4.8	38.1	
WEIGHTED-AVERAGE (TOTAL X 4/N)		14.8	20.0	14.8	14.0	4.0	16.0	7.2	7.6	4.4	12.0	18.4	19.2	152.4	

NOTE: See Appendix A for explanation of values.

### GOSHUTE RANGE

The topographic value of the Goshute Range is considered good with areas of excellent escape terrain (Figure 21 and 22). Water distribution is adequate and available during all seasons (Table 13). The vegetative composition is fair to good, however, density values are low overall. Some areas, including the best potential bighorn habitat, are densely forested by pinyon and juniper.

The evaluation suggests that the Goshute Range is a poor potential site for bighorn sheep introduction in its present condition despite the relative high priority placing it holds among the 16 sites surveyed.

Approximately 179 square miles of the Goshute's were investigated and only about 32 percent or .58 square miles can be classified as good to fair habitat (Figure 20). This is based on sites with values of 160+ weighted points and the quality of adjacent habitat (see Appendix B). The overall weighted average for the seven sites in good to fair habitat averaged 173 points (see Table 14). A subjective estimate of the expected carrying capacity for this area was determined to be 3.0 bighorns/square mile, which would allow approximately 203 bighorns for the best areas of the Goshute's.

Improvements in vegetation composition and density should be the main concern of further evaluations. There appears to be a need to increase the proportions of preferred grasses and shrubs as well as their overall density in general. The northern third of the range, with the poorest conditions, may be helped by a reduction in the numbers of horses and cattle or other grazing management practices. The dense pinyon-juniper areas, which include much of the best topography, is the single most important negative factor in proposing the site for bighorn introductions. This coupled with the fact that domestic sheep are grazed adjacent to the potential habitat areas would be considered in any further evaluation of the site.

ELKO

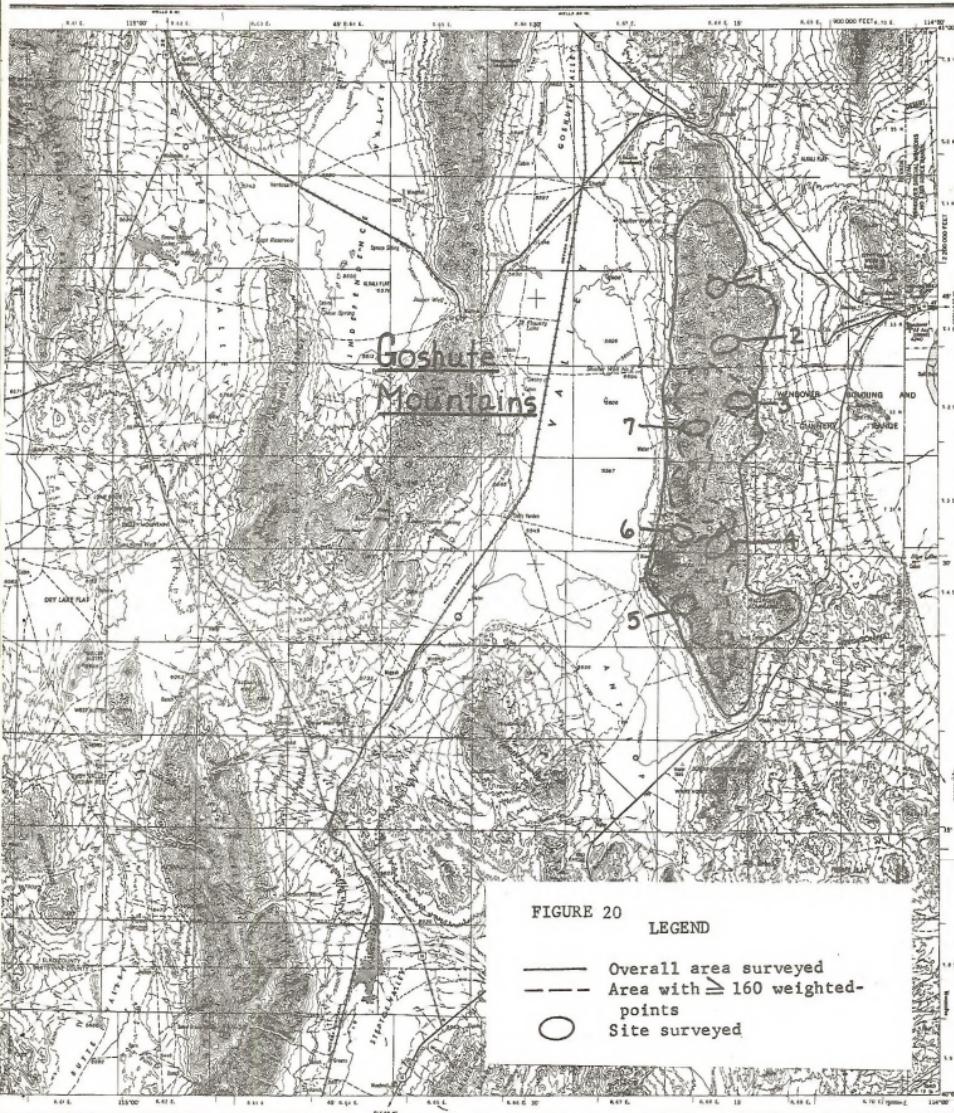


FIGURE 20

LEGEND

- Overall area surveyed
- - - Area with  $\geq 160$  weighted-points
- Site surveyed

INTERIOR GEOLOGICAL SURVEY, WASHINGTON, D.C. 1982  
NG 5705

0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 95 100 105 110 115 120 125 130 135 140 145 150 155 160 165 170 175 180 185 190 195 200 205 210 215 220 225 230 235 240 245 250 255 260 265 270 275 280 285 290 295 300 305 310 315 320 325 330 335 340 345 350 355 360 365 370 375 380 385 390 395 400 405 410 415 420 425 430 435 440 445 450 455 460 465 470 475 480 485 490 495 500 505 510 515 520 525 530 535 540 545 550 555 560 565 570 575 580 585 590 595 600 605 610 615 620 625 630 635 640 645 650 655 660 665 670 675 680 685 690 695 700 705 710 715 720 725 730 735 740 745 750 755 760 765 770 775 780 785 790 795 800 805 810 815 820 825 830 835 840 845 850 855 860 865 870 875 880 885 890 895 900 905 910 915 920 925 930 935 940 945 950 955 960 965 970 975 980 985 990 995 1000 1005 1010 1015 1020 1025 1030 1035 1040 1045 1050 1055 1060 1065 1070 1075 1080 1085 1090 1095 1100 1105 1110 1115 1120 1125 1130 1135 1140 1145 1150 1155 1160 1165 1170 1175 1180 1185 1190 1195 1200 1205 1210 1215 1220 1225 1230 1235 1240 1245 1250 1255 1260 1265 1270 1275 1280 1285 1290 1295 1300 1305 1310 1315 1320 1325 1330 1335 1340 1345 1350 1355 1360 1365 1370 1375 1380 1385 1390 1395 1400 1405 1410 1415 1420 1425 1430 1435 1440 1445 1450 1455 1460 1465 1470 1475 1480 1485 1490 1495 1500 1505 1510 1515 1520 1525 1530 1535 1540 1545 1550 1555 1560 1565 1570 1575 1580 1585 1590 1595 1600 1605 1610 1615 1620 1625 1630 1635 1640 1645 1650 1655 1660 1665 1670 1675 1680 1685 1690 1695 1700 1705 1710 1715 1720 1725 1730 1735 1740 1745 1750 1755 1760 1765 1770 1775 1780 1785 1790 1795 1800 1805 1810 1815 1820 1825 1830 1835 1840 1845 1850 1855 1860 1865 1870 1875 1880 1885 1890 1895 1900 1905 1910 1915 1920 1925 1930 1935 1940 1945 1950 1955 1960 1965 1970 1975 1980 1985 1990 1995 2000 2005 2010 2015 2020 2025 2030 2035 2040 2045 2050 2055 2060 2065 2070 2075 2080 2085 2090 2095 2100 2105 2110 2115 2120 2125 2130 2135 2140 2145 2150 2155 2160 2165 2170 2175 2180 2185 2190 2195 2200 2205 2210 2215 2220 2225 2230 2235 2240 2245 2250 2255 2260 2265 2270 2275 2280 2285 2290 2295 2300 2305 2310 2315 2320 2325 2330 2335 2340 2345 2350 2355 2360 2365 2370 2375 2380 2385 2390 2395 2400 2405 2410 2415 2420 2425 2430 2435 2440 2445 2450 2455 2460 2465 2470 2475 2480 2485 2490 2495 2500 2505 2510 2515 2520 2525 2530 2535 2540 2545 2550 2555 2560 2565 2570 2575 2580 2585 2590 2595 2600 2605 2610 2615 2620 2625 2630 2635 2640 2645 2650 2655 2660 2665 2670 2675 2680 2685 2690 2695 2700 2705 2710 2715 2720 2725 2730 2735 2740 2745 2750 2755 2760 2765 2770 2775 2780 2785 2790 2795 2800 2805 2810 2815 2820 2825 2830 2835 2840 2845 2850 2855 2860 2865 2870 2875 2880 2885 2890 2895 2900 2905 2910 2915 2920 2925 2930 2935 2940 2945 2950 2955 2960 2965 2970 2975 2980 2985 2990 2995 3000 3005 3010 3015 3020 3025 3030 3035 3040 3045 3050 3055 3060 3065 3070 3075 3080 3085 3090 3095 3100 3105 3110 3115 3120 3125 3130 3135 3140 3145 3150 3155 3160 3165 3170 3175 3180 3185 3190 3195 3200 3205 3210 3215 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GOSHUTE MOUNTAINS

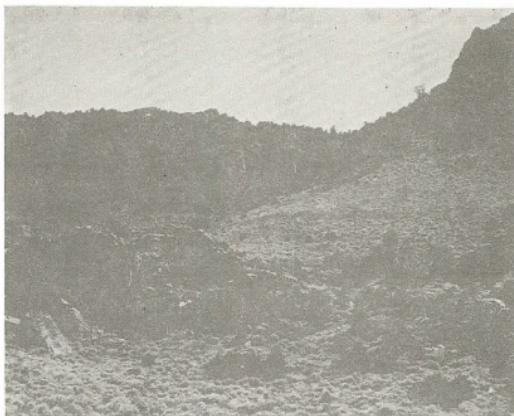


FIGURE 21. Steep and rocky terrain broken by canyons of varying widths. East Central Side.

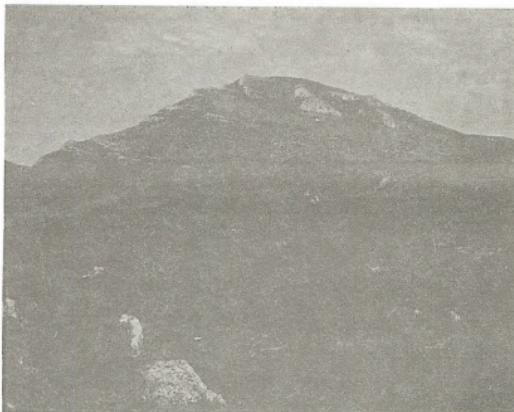


FIGURE 22. Steep and rocky terrain broken by canyons and rolling hills. Goshute Peak Area.

TABLE 13. POTENTIALLY IMPORTANT WATER SOURCES IN THE GOSHUTE MOUNTAINS.

WATER SOURCE	KNOWN STATUS	LOCATION
*Unnamed Spring	Open spring - seldom dry	T.32N., R.68E., Sec. 11
Unnamed Spring		T.32N., R.68E., Sec. 16
*Unnamed Spring	Open spring - seldom dry	T.32N., R.68E., Sec. 29
Choke Cherry Spring		T.32N., R.68E., Sec. 36
Unnamed Spring		T.31N., R.68E., Sec. 17
Lion Canyon Spring		T.31N., R.68E., Sec. 16
Unnamed Spring		T.31N., R.68E., Sec. 20
*Unnamed Spring	Open spring - seldom dry	T.31N., R.68E., Sec. 27
Black Point Spring		T.30N., R.68E., Sec. 5
*Unnamed Spring	Open seep - partly dry	T.30N., R.68E., Sec. 21
Unnamed Spring		T.29N., R.68E., Sec. 3
Unnamed Spring		T.30N., R.68E., Sec. 25
Unnamed Spring		T.30N., R.68E., Sec. 14
Unnamed Spring		T.30N., R.68E., Sec. 1

\*Observed water sources

TABLE 14. GOSHUTE RANGE, HABITAT SITE EVALUATION.

SITE	TOPO-GRAPHY	WATER AVAILABILITY				VEGETATION			ANIMAL USE		HUMAN USE		TOTAL (TOTAL X 4)	WEIGHT- ED TOTAL	
		A	B	C	D	A	B	C	A	B	A	B			
1	3 b	5	4	3	1	4	1	2	1	3	3	5	35	140	
2	4	5	4	4	2	3	1	2	2	3	4	5	39	156	
3	5	5	4	4	3	3	4	2	3	3	3	5	44	176	
4	4	4	4	4	3	3	3	3	3	3	5	5	44	176	
5	4	4	3	4	3	3	1	2	3	3	5	5	40	160	
6	3 b	4	4	3	2	3	2	2	3	3	5	5	39	156	
7	5	5	4	4	3	3	3	3	3	3	4	5	45	180	
TOTAL		28	32	27	26	17	22	15	15	18	21	29	35	286	844
AVERAGE		4	4.6	3.9	3.7	2.4	3.1	2.1	2.1	2.6	3.0	4.1	5.0	40.9	
WEIGHTED-AVERAGE (TOTAL X 4/N)															
16.0      18.3      15.4      14.9      9.7      12.6      8.6      8.6      10.3      12.0      16.6      20.0      163.4															

NOTE: See Appendix A for explanation of values.

#### HUMBOLDT RANGE

The Humboldt Range is nearly evenly divided between Public Lands and private holdings, therefore, it may create a difficult management situation for possible bighorn reintroductions. These difficulties should not be insurmountable if careful planning and management can be carried out through the cooperation of all concerned parties.

The topography and water availability are both excellent for big-horns in the Humboldt's. Nearly all of the area investigated contains steep slopes and rugged escape terrain (see Figure 23) while all observed water sources appeared to be sufficient and present yearlong and favorably located (see Table 15). Vegetation composition and density were generally good throughout the range, with the best conditions found in the western and central regions. Livestock especially domestic sheep grazing will present a serious threat to any introduced bighorn. These animals are not compatible and will no doubt present significant competition for forage. In addition disease transmission and hybridization between domestic and wild sheep could present serious problems to both resources.

Most of the human activity is related to ranching and mining and is spread throughout the range. It is very possible that as human needs increase there may be a resurgence of mining activity at several sites within the range.

The information obtained in this preliminary evaluation indicates that, even though its land status may create conflicts, the physical properties of the Humboldt Range should be considered good habitat for bighorn sheep (see Figure 24 and 25). Of the approximately 115 square-miles investigated as potential habitat, about 78 percent or 90 square-miles can be classified as good to excellent. This is based on sites with values of 160+ weighted-points and the quality of adjacent habitat (see Appendix B). The overall weighted-average for the 12 sites surveyed is 183.0 points, and these sites were all in good to excellent habitat (see Table 16). A subjective estimate of the expected carrying capacity was determined to be 4.0 bighorns/square-mile. This estimate would allow for approximately 359 sheep in the Humboldt's, not considering areas with less than 160 weighted-points (see Appendix C).

The Humboldt Range has a very high numerical rating, which is influenced primarily by the size of the area, however, some serious deficiencies must be considered before a fair priority rating can be given. The presence of domestic sheep in the potential habitat area is a serious negative impact to any proposal for introducing bighorn sheep. In addition the Humboldt Range is complicated by the alternate section land ownership pattern. Agreements with land owners may be a difficult prerequisite to a transplant of bighorn sheep.

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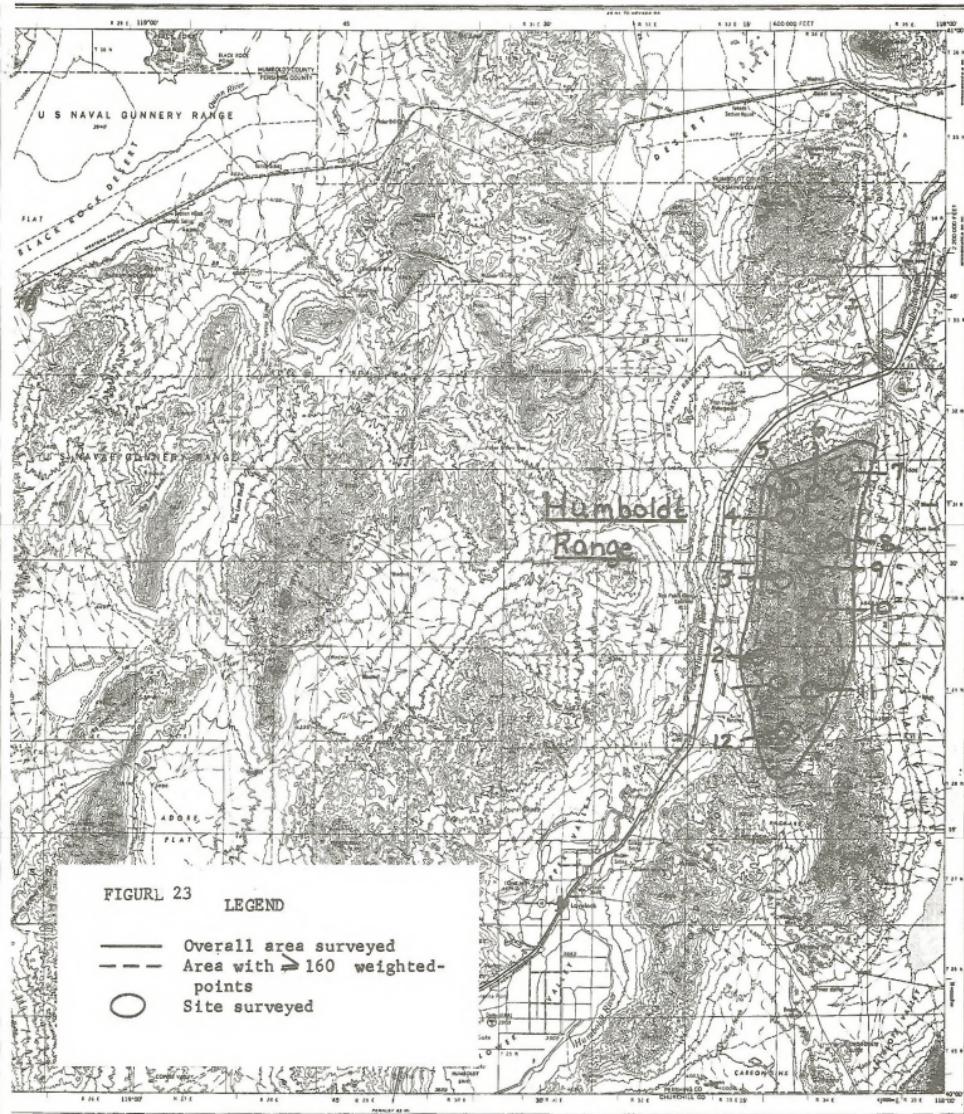


FIGURE 23 LEGEND

— Overall area surveyed  
 - - - Area with  $\geq 160$  weighted points  
 O Site surveyed

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CONTINUOUS-PIPERING SYSTEM

-42-

HUMBOLDT RANGE

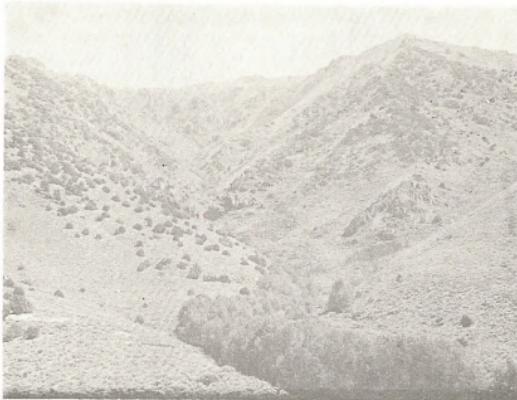


FIGURE 24. Steep and rocky terrain broken frequently by canyons of varying widths. Wright Canyon.



FIGURE 25. Steep and rocky terrain broken frequently by canyons of varying widths. Upper Black Canyon.

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TABLE 15. POTENTIALLY IMPORTANT WATER SOURCES IN THE HUMBOLDT RANGE.

WATER SOURCE	KNOWN STATUS	LOCATION
Sacred Canyon Spring		T.32N., R.34E., Sec. 27
*Tehama Canyon Spring	Always present - open seep	T.31N., R.34E., Sec. 2, 10, 11
Thunder Canyon Creek		T.32N., R.34E., Sec. 33
Santa Clara Springs		T.31N., R.34E., Sec. 11
*Prince Royal Canyon Spring	Always present - open seep	T.31N., R.34E., Sec. 9
*Humboldt Canyon Spring	Always present - open seep	T.31N., R.34E., Sec. 7, 8
Unnamed Spring		T.32N., R.34E., Sec. 31
Florida Canyon Spring		T.31N., R.33E., Sec. 11, 12
Johnson Canyon Spring		T.31N., R.34E., Sec. 18
*Black Canyon Spring	Always present - open seep	T.31N., R.33E., Sec. 13, 14
Antelope Canyon Creek		T.31N., R.34E., Sec. 19, 20
Star Creek		T.31N., R.33E., Sec. 14, 24
Eldorado Canyon Creek		T.31N., R.34E., Sec. 19, 20
*Bloody Canyon Springs	Always present - open seep	T.31N., R.33E., Sec. 23, 24
Unnamed Creek		T.31N., R.34E., Sec. 29, 30
Unnamed Spring		T.31N., R.34E., Sec. 21, 22, 23
Unnamed Creek		T.31N., R.33E., Sec. 25, 26, 36
Unnamed Creek		T.31N., R.34E., Sec. 31, 32
		T.31N., R.34E., Sec. 26, 27, 34, 35
		T.31N., R.33E., Sec. 35, 36
		T.30N., R.34E., Sec. 2
		T.30N., R.34E., Sec. 3
		T.31N., R.34E., Sec. 33, 34
		T.30N., R.33E., Sec. 1
		T.30N., R.34E., Sec. 6, 7
*Coyote Canyon Spring	Always present - open seep	T.30N., R.34E., Sec. 3, 10
*Coyote Canyon Creek	Always present - open flow	T.30N., R.34E., Sec. 3, 4, 5, 9, 10
John Brown Canyon Creek		T.30N., R.34E., Sec. 9, 10
*Buffalo Canyon	Seldom dry during summers	T.30N., R.33E., Sec. 1, 12
		T.30N., R.34E., Sec. 7
Echo Canyon Creek		T.30N., R.33E., Sec. 12, 13
		T.30N., R.34W., Sec. 18

TABLE 15. POTENTIALLY IMPORTANT WATER SOURCES IN THE HUMBOLDT RANGE.

WATER SOURCE	KNOWN STATUS	LOCATION
Unnamed Spring		T.30N., R.33E., Sec. 13, 14
Panther Canyon Creek		T.30N., R.34E., Sec. 19
Unnamed Creek		T.30N., R.34E., Sec. 23, 24
Ryepatch Canyon Creek		T.30N., R.34E., Sec. 30, 31
Big Canyon Creek		T.30N., R.34E., Sec. 25, 35, 36
Congress Canyon Creek		T.30N., R.34E., Sec. 31
*N. Fork Straight Canyon Creek		T.30N., R.34E., Sec. 14, 15, 23
S. Fork Straight Canyon Creek		T.30N., R.34E., Sec. 15, 16, 22
Monitor Canyon Creek		T.30N., R.34E., Sec. 20, 21
Wilson Canyon Creek		T.30N., R.34E., Sec. 21, 28, 29
Peru Canyon Creek		T.30N., R.34E., Sec. 28, 29
Jackson Canyon Creek		T.30N., R.34E., Sec. 32, 33
N. Fork Cottonwood Canyon Creek		T.30N., R.34E., Sec. 26, 34, 35
S. Fork Cottonwood Canyon Creek		T.30N., R.34E., Sec. 35
*Indian Creek	Always present - open flow	T.29N., R.34E., Sec. 2, 3
Pole Canyon Creek		T.29N., R.34E., Sec. 3, 4
*Wright Canyon Creek	Always present - open flow	T.29N., R.34E., Sec. 8, 9, 10
Horse Canyon Creek		T.29N., R.34E., Sec. 16, 17, 21, 22
*Sacramento Canyon Creek	Always present - open flow	T.29N., R.33E., Sec. 23, 24
*Sacramento Canyon Spring	Always present - open seep	T.29N., R.34E., Sec. 19, 20
		T.29N., R.34E., Sec. 11, 12
		T.29N., R.34E., Sec. 7, 18
		T.29N., R.34E., Sec. 24
		T.29N., R.34E., Sec. 29, 30
		T.29N., R.34E., Sec. 36
		T.29N., R.34E., Sec. 31, 32
		T.29N., R.34E., Sec. 32

\*Observed water sources

TABLE 16. HUMBOLDT RANGE, HABITAT SITE EVALUATION.

SITE	TOPO-GRAPHY	WATER AVAILABILITY				VEGETATION			ANIMAL USE		HUMAN USE		TOTAL (TOTAL X 4)	WEIGHTED TOTAL	
		A	B	C	D	A	B	C	A	B	A	B			
1	5	5	5	5	2	4	3	3	2	3	5	5	47	188	
2	5	5	5	5	2	4	3	2	2	3	5	5	46	184	
3	5	5	4	5	2	4	3	3	2	3	5	5	46	184	
4	5	5	5	5	2	4	3	3	2	3	4	4	45	180	
5	5	5	5	5	2	4	3	3	2	3	4	4	45	180	
6	5	5	5	5	2	4	3	3	2	2	5	5	46	184	
7	5	5	5	5	2	3	2	3	2	3	5	5	45	180	
8	5	5	5	5	2	4	2	3	3	3	5	5	47	188	
9	5	5	5	5	2	4	2	3	2	3	4	4	44	176	
10	5	5	5	5	3	4	3	3	3	3	4	4	47	188	
11	5	5	5	5	2	4	2	3	2	3	5	5	46	184	
12	5	5	5	5	2	4	2	3	2	3	4	5	45	180	
TOTAL		60	60	59	60	25	47	31	35	26	35	55	56	549	2,196
AVERAGE		5.0	5.0	4.9	5.0	2.1	3.9	2.6	2.9	2.2	2.9	4.6	4.7	45.8	
WEIGHTED-AVERAGE (TOTAL X 4/N)		20.0	20.0	19.7	20.0	8.3	15.7	10.3	11.7	8.7	11.7	18.3	18.7	183.0	

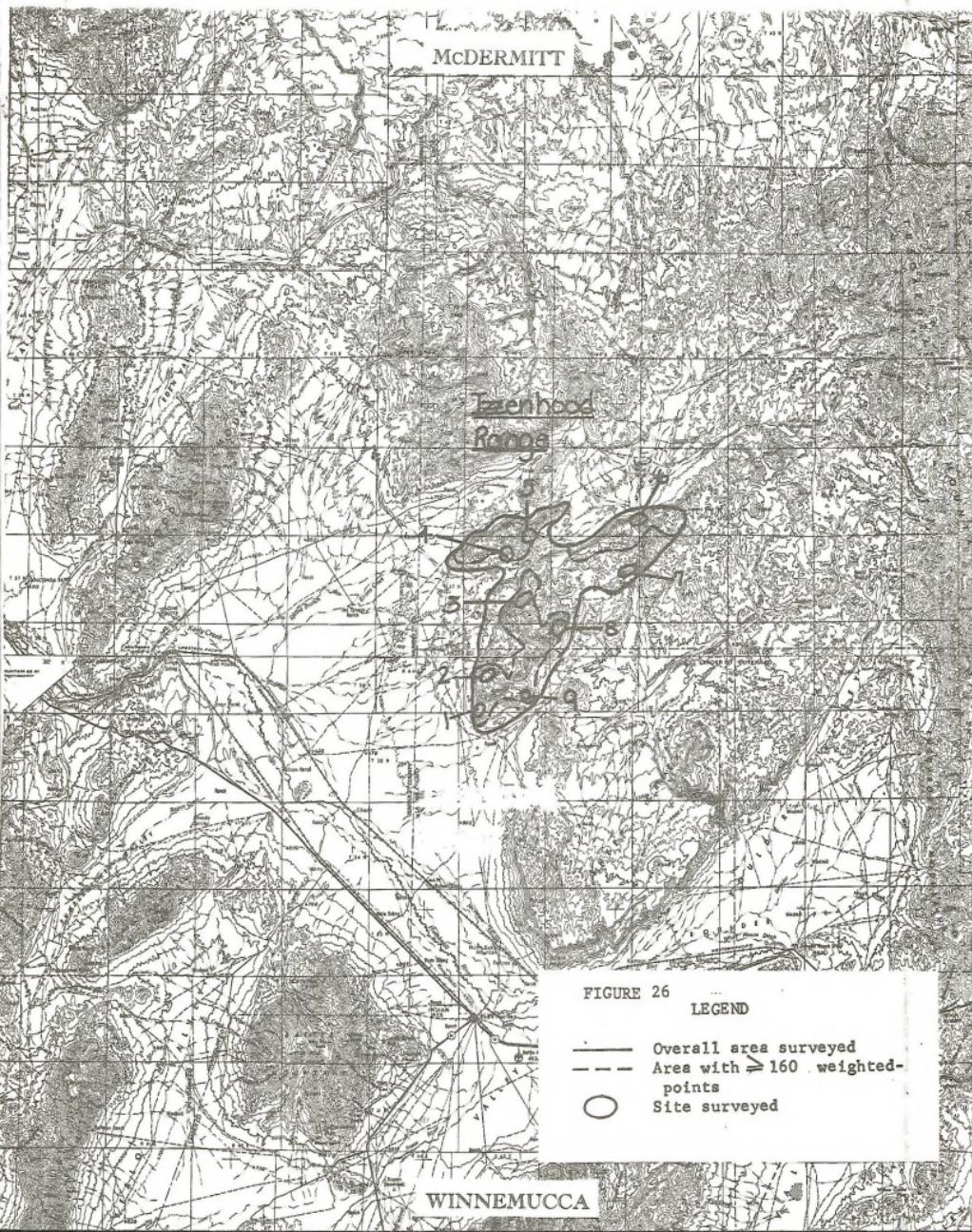
NOTE: See Appendix A for explanation of values.

#### IZZENHOOD MOUNTAINS

This preliminary evaluation has obtained information indicating that the Izzenhood Mountains should be considered fair habitat for bighorn sheep. The topographic features are adequate as well as water distribution and availability (see Table 17). Of the approximately 110 square-miles investigated (see Figure 26) about 49 percent or 54 square-miles can be classified as good bighorn habitat. This is based on sites with values of 160+ weighted-points and the quality of adjacent habitat (see Appendix B). The overall weighted-average for the nine sites surveyed is 170.2 points, while the eight sites in good habitat average 173.0 weighted-points (see Table 18). The best potential areas lie in the higher and more rugged terrain of the south, central, northwest and northeast portions of the Izzenhood's (see Figure 27 and 28). For these areas, a subjective estimate of the expected carrying capacity was determined to be 3.5 bighorns/square-mile. This estimate would allow for approximately 189 sheep, not considering areas with less than 160 weighted-points (see Appendix C).

The general conclusion from field analysis shows that the potential for meeting all of the physical requirements for bighorn habitat are generally met. However, there are significant negative impacts that would seriously threaten a proposed bighorn transplant. Perhaps the most serious impact is domestic sheep grazing of the area. Conflicts between these resources must be resolved prior to initiation of a proposed reintroduction.

Past livestock grazing has adversely impacted the vegetation of the area. Significant recovery of the vegetative resource would be a prerequisite for bighorn establishment. Considering the numerical rating in addition to the more serious conflicts discussed it is suggested the area be placed in low priority.



IZZENHOOD MOUNTAINS

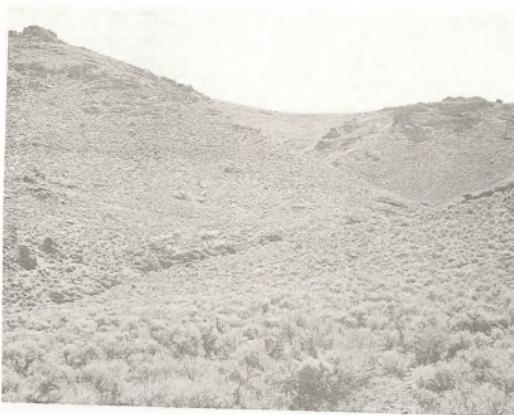


FIGURE 27. Steep and rocky terrain broken by canyons of varying widths.  
High Central Area.



FIGURE 28. Steep and rocky terrain broken by canyons and rolling hills.  
Six Mile Peak Area.

TABLE 17. POTENTIALLY IMPORTANT WATER SOURCES IN THE IZZENHOOD MOUNTAINS.

WATER SOURCE	KNOWN STATUS	LOCATION
Indian Springs		T.38N., R.45E., Sec. 32, 33
Unnamed Spring		T.37N., R.45E., Sec. 7
*Unnamed Spring	Dry for part of dry summers	T.37N., R.45E., Sec. 10
*Unnamed Spring	Dry for part of dry summers	T.38N., R.47E., Sec. 29
*Rock Creek	Always present - open flow	T.38N., R.47E., Sec. 31
Unnamed Spring		T.37N., R.45E., Sec. 33
*Unnamed Spring	Sometimes dry - seep	T.37N., R.45E., Sec. 35
Unnamed Spring		T.37N., R.46E., Sec. 19
Unnamed Spring		T.37N., R.46E., Sec. 32
*Unnamed Spring	Seldom dry - open seep	T.36N., R.46E., Sec. 6
Unnamed Spring		T.36N., R.46E., Sec. 7
Unnamed Spring		T.36N., R.45E., Sec. 11
Unnamed Spring		T.36N., R.45E., Sec. 22
*Unnamed Spring	Dry for part of dry summers	T.36N., R.45E., Sec. 20
Unnamed Spring		T.36N., R.45E., Sec. 33

\*Observed water sources

TABLE 18. IZZENHOOD MOUNTAINS, HABITAT SITE EVALUATION.

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SITE	TOPO-GRAPHY	WATER AVAILABILITY				VEGETATION			ANIMAL USE		HUMAN USE		TOTAL (TOTAL X 4)	
		A	B	C	D	A	B	C	A	B	A	B		
1	4	4	3	5	2	4	2	2	2	4	5	5	42	168
2	4	4	3	5	2	4	2	2	3	4	5	5	43	172
3	5	4	3	5	2	4	2	3	3	4	5	5	45	180
4	5	4	3	5	2	4	2	2	2	4	5	5	43	172
5	5	4	3	5	2	4	2	2	2	4	5	5	43	172
6	4	5	5	4	2	4	2	2	3	4	4	4	43	172
7	3 b&c	5	5	3	1	4	2	1	1	4	4	4	37	148
8	4	5	4	5	2	4	3	3	2	3	5	5	45	180
9	4	4	3	5	2	4	2	2	3	4	4	5	42	168
TOTAL		38	39	32	42	17	36	19	19	21	35	42	383	1,532
AVERAGE		4.2	4.3	3.6	4.7	1.9	4.0	2.1	2.1	2.3	3.9	4.7	4.8	42.6
WEIGHTED-AVERAGE (TOTAL X 4/N)														
16.9	17.3	14.2	18.7	7.6	16.0	8.4	8.4	9.3	15.6	18.7	19.1	170.2		

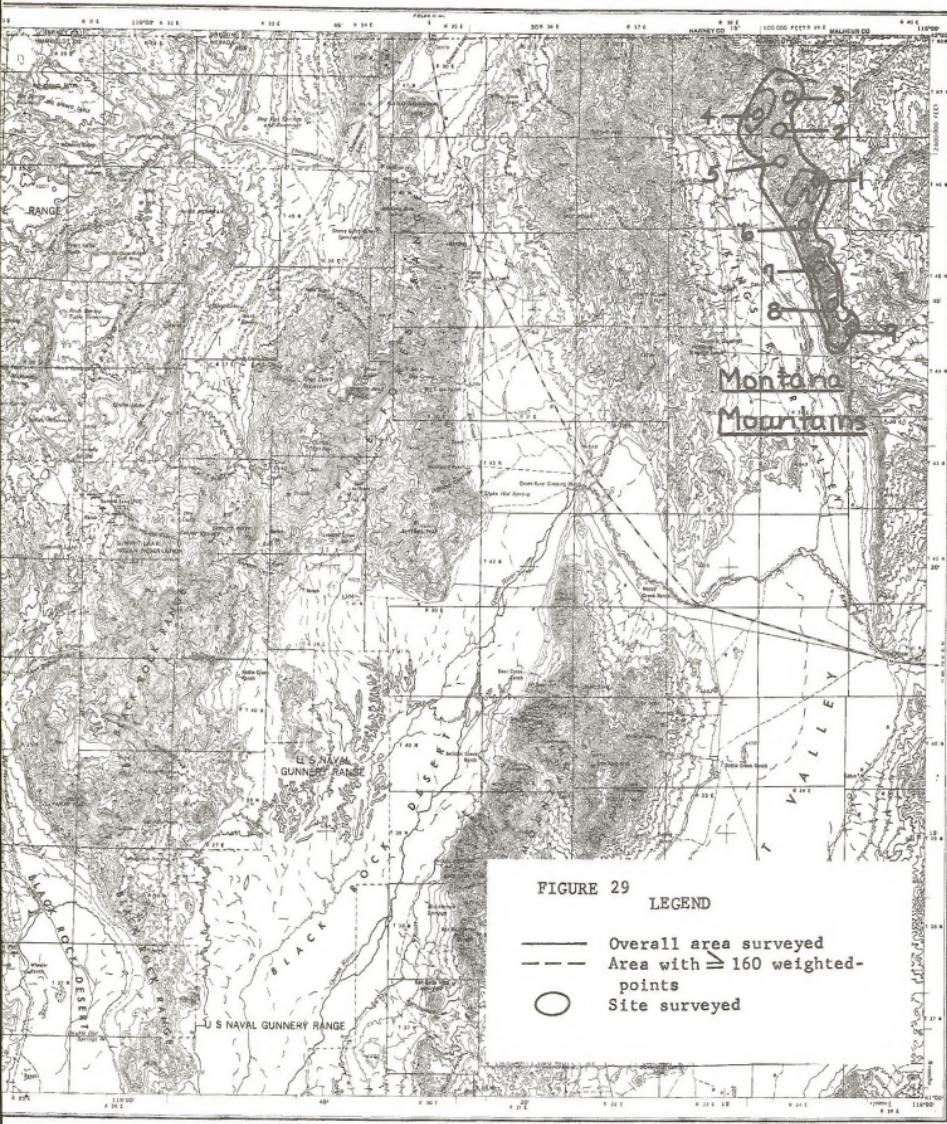
NOTE: See Appendix A for explanation of values.

#### MONTANA MOUNTAINS

Nearly all of the Montana Mountains are located on Public Lands administered by the Bureau of Land Management. The topography of this range is generally good, with the southern half exhibiting the best topographic features (see Figure 29). Overall water is available and well distributed (see Table 19).

The results of this field evaluation indicates that the Montana Mountains should be considered poor habitat for bighorn sheep. Of the approximately 48 square miles investigated only about 30 percent or 15 square miles can be classified as good. This is based on sites with values of 160+ weighted points and the quality of adjacent habitat (see Appendix B). The overall weighted average for the nine sites surveyed is 162.2 points, while the five sites in good habitat average 168 points (see Table 20). The potential areas are found in the central portion of the range and along the west facing escarpment, (see Figures 30 and 41). A subjective estimate of the expected carrying capacity for these areas areas was determined to be 3.0 bighorns/square mile. This estimate would allow for approximately 44 sheep (see Appendix C).

The physical habitat values found on the Montana Mountains meet the requirements of bighorn sheep. The most important negative impact is the present condition of the range as a result of past and present livestock grazing abuses and current mining activities. Despite the relatively low priority values obtained the area has some potential and deserves further evaluation. The primary reason for the low overall numerical rating was the small size of the area described as potential habitat and the potential size of the population that could be expected to be established.



MONTANA MOUNTAINS



FIGURE 30. Steep and somewhat rocky terrain intermixed with rolling hills. Little Peak Area.

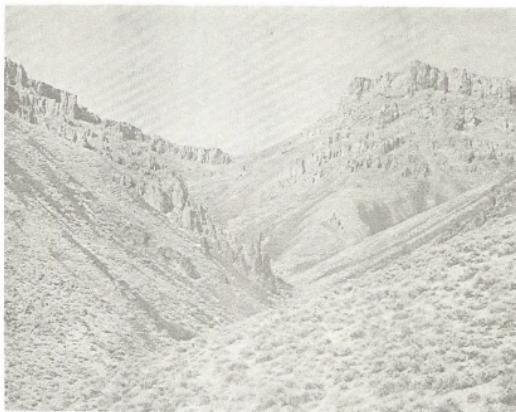


FIGURE 31. Steep and rocky terrain broken frequently by canyons of varying widths. Sheep Ranch Springs Area.

TABLE 19. POTENTIALLY IMPORTANT WATER SOURCES IN THE MONTANA MOUNTAINS.

WATER SOURCE	KNOWN STATUS	LOCATION
East Fork Granite Creek		
*Johnny Creek	Seldom dry - light flow	T.47N., R.33E., Sec. 13, 23, 24
*Unnamed Springs	Always present - open seep	T.47N., R.33E., Sec. 26, 35
*Unnamed Springs	Always present - open seep	T.47N., R.33E., Sec. 25
*China Creek	Always present - open flow	T.47N., R.34E., Sec. 17, 20
Summit Spring		T.47N., R.33 & 34E.
South Fork Spring		T.47N., R.34E., Sec. 32
Ike's Spring		T.46N., R.34E., Sec. 8
*Cherry Creek	Always present - open flow	T.46N., R.34E., Sec. 9
*Horse Creek Spring	Always present - open seep	T.46N., R.34E., Sec. 16, 21
*Horse Creek	Always present - open flow	T.46N., R.34E., Sec. 15
Calavera Canyon Creek		T.46N., R.34E., Sec. 14, 15
*Unnamed Springs	Seldom dry - seep	T.45N., R.34E., Sec. 10
Garden Creek		T.45N., R.34E., Sec. 15
Unnamed Springs	Always present - open seep	T.45N., R.34E., Sec. 22, 23, 14
*Sheep Ranch Springs		T.45N., R.34E., Sec. 23
Unnamed Springs		T.45N., R.34E., Sec. 26, 27
*Thacker Creek	Seldom dry - light flow	T.44N., R.34E., Sec. 1, 2, 11
		T.44N., R.34E., Sec. 1

\*Observed water sources

TABLE 20. MONTANA MOUNTAINS, HABITAT SITE EVALUATION.

SITE	TOPO-GRAPHY	WATER AVAILABILITY				VEGETATION			ANIMAL USE		HUMAN USE		TOTAL (TOTAL X 4)	WEIGHTED-TOTAL	
		A	B	C	D	A	B	C	A	B	A	B			
1	4	5	5	4	2	4	3	3	1	2	3	4	40	160	
2	3 b	5	4	4	1	4	3	3	1	3	3	5	39	156	
3	3 b	5	5	3	1	4	3	3	1	3	3	5	39	156	
4	4	5	5	4	1	4	2	3	1	3	3	5	40	160	
5	4	5	4	4	1	4	3	2	1	3	3	5	39	156	
6	5	5	5	4	1	4	3	3	3	3	1	1	38	152	
7	5	5	4	4	2	4	3	2	3	3	3	4	42	168	
8	5	5	5	5	1	4	3	2	2	3	5	5	45	180	
9	5	5	4	4	1	4	3	2	2	3	5	5	43	172	
TOTAL		38	45	41	36	11	36	26	23	15	26	29	39	365	1,460
AVERAGE		4.2	5.0	4.6	4.0	1.2	4.0	2.9	2.6	1.7	2.9	3.2	4.3	40.6	
WEIGHTED-AVERAGE (TOTAL X 4/N)															
16.9	20.0	18.2	16.0	4.9	16.0	11.6	10.2	6.7	11.6	12.9	17.3	162.2			

Note: See Appendix A for explanation of values.

#### PILOT PEAK

The large proportion of private land on Pilot Peak may present a problem for potential bighorn management objectives. The topography of Pilot Peak is excellent for bighorns, as all of the terrain above 6,000 ft. is very steep and rugged. The only drawback topographically is the small area of the peak (see Figure 32). Water availability is also good, with all observed sources in steep terrain and present yearlong (see Table 21). The vegetation composition and density on the peak should provide sheep, especially in the higher areas, with plentiful forage. Neither the water nor vegetation components show signs of heavy livestock or big game utilization. Since domestic sheep are allotted to graze in the lower valley area, it is possible that detrimental competitive and reproductive impacts could occur with bighorns. Human presence on Pilot Peak is very light and is not expected to present any problem for bighorns if current use patterns and levels continue.

The information obtained in this preliminary evaluation indicates that, even though land status may create conflicts, Pilot Peak should be considered good habitat for bighorn sheep reintroductions. Of the approximately 43 square-miles investigated, about 74 percent or 31 square-miles can be classified as good to excellent. This is based on sites with values of 160+ weighted-points and the quality of adjacent habitat (see Appendix B). The overall weighted-average for the three sites surveyed is 189.9 points, and these are all in good to excellent habitat (see Table 22). The best potential area is located above 6,000 ft. (see Figures 33 and 34). For this area, a subjective estimate of the expected carrying capacity was determined to be 4.5 bighorns/square-mile. This estimate would allow for approximately 141 sheep on Pilot Peak, not considering areas with less than 160 weighted-points (see Appendix C).

The first priority for future management should be resolving checkerboard land ownership of the area and formulating workable programs for bighorn management.

Secondarily, and in conjunction with this, care should be exercised to restrict future grazing by livestock, especially domestic sheep, above 6,000 ft. and to limit increases in mineral development near potentially vital bighorn sheep habitat.

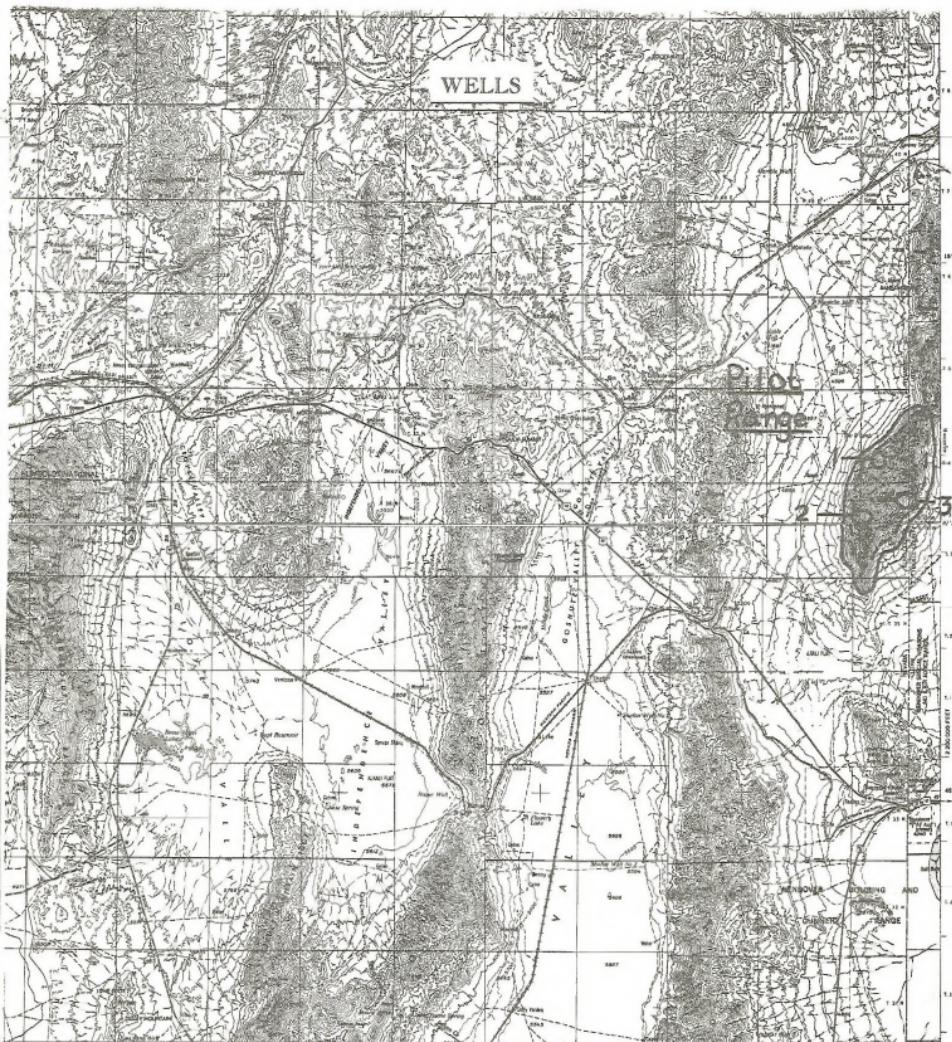


FIGURE 32

LEGEND

- Overall area surveyed
- Area with  $\geq 160$  weighted points
- Site surveyed

PILOT PEAK



FIGURE 33. Steep canyons and talus slopes and large rock outcrops typical of Pilot Peak - southwest side of Pilot Peak.



FIGURE 34. Steep canyons and talus slopes and large rock outcrops typical of Pilot Peak - east slope of Pilot Peak.

TABLE 21. POTENTIALLY IMPORTANT WATER SOURCES IN THE PILOT PEAK AREA.

WATER SOURCE	KNOWN STATUS	LOCATION
Cove Springs		T.5N., R.19W., Sec. 28, 29 Box Elder Co., UT
Debbs Canyon Spring		T.37N., R.70E., Sec. 20, 29
*Horse Canyon Spring	Always present - open flow	T.37N., R.70E., Sec. 19, 30, 29
Unnamed Springs		T.37N., R.70E., Sec. 31
Unnamed Springs		T.36N., R.70E., Sec. 7
*Unnamed Spring	Always present - open flow	T.36N., R.70E., Sec. 6, 7, 19
Miners Spring		T.36N., R.70E., Sec. 17
Willow Canyon Springs		T.36N., R.70E., Sec. 16
*Unnamed Springs	Always present - open flow	T.36N., R.70E., Sec. 4, 5, 9
Unnamed Spring		T.37N., R.70E., Sec. 33
Bettridge Creek Springs		T.37N., R.70E.; Sec. 28
Unnamed Springs		T.4N., R. 19W., Sec. 3, 9, 10, 16 Box Elder Co., UT
Unnamed Springs		T.5N., R.19W., Sec. 27, 34 Box Elder Co., UT

\*Observed water sources

TABLE 22. PILOT PEAK, HABITAT SITE EVALUATION.

SITE	TOPOGRAPHY	WATER AVAILABILITY				VEGETATION			ANIMAL USE		HUMAN USE		TOTAL (TOTAL X 4)	WEIGHTED TOTAL	
		A	B	C	D	A	B	C	A	B	A	B			
1	5	5	5	4	4	3	3	3	3	3	5	5	48	192	
2	5	5	5	4	3	3	3	2	4	3	5	5	47	188	
3	5	5	5	4	3	3	3	2	4	3	5	5	47	188	
TOTAL		15	15	15	12	11	9	9	7	11	9	15	15	142	568
AVERAGE		5.0	5.0	5.0	4.0	3.7	3.0	3.0	2.3	3.7	3.0	5.0	5.0	47.3	
WEIGHTED-AVERAGE (TOTAL X 4/N)															
20.0 20.0 20.0 16.0 14.7 12.0 12.0 9.3 14.7 12.0 20.0 20.0 189.3															

NOTE: See Appendix A for explanation of values.

#### PINE FOREST RANGE

Most of the Pine Forest Range (Figure 35) is in public ownership with a portion around Blue Lakes designated as a roadless area. The topographic features of the range is good, with the most rugged terrain in the northern and central portion of the range (Figure 36). The rugged topography is not continuous, however, and much of the area is characterized by steep canyon slopes rather than rocky cliffs and outcrops, (Figure 37). Water distribution and availability is adequate with most observed sources in favorable terrain, (Table 23). Potential forage for bighorn is generally sufficient and in some areas plentiful. Competition from livestock or big game is not a problem at this time.

This preliminary evaluation indicates that the Pine Forest Range should be considered an excellent potential reintroduction site. Of the approximately 137 square miles investigated, about 75 percent or 102 square miles can be classified as good to excellent habitat based on sites with values in excess of 160 weighted points, (Appendix B). The overall average for the ten sites surveyed is 175.2 points, while the nine sites in good to excellent habitat average 177.8 points (see Table 24). A subjective estimate of the expected carrying capacity for the best habitat areas was determined to be 4.0 bighorns/square mile. This estimate would allow approximately 408 sheep (Appendix C).

The Pine Forest range exhibits all the necessary qualities of an excellent bighorn sheep transplant location. While certain improvements in habitat quality could be made it appears that this would not be a prerequisite for a successful transplant program. It is our conclusion that this range receive the highest priority of the 16 investigated (Appendix D).

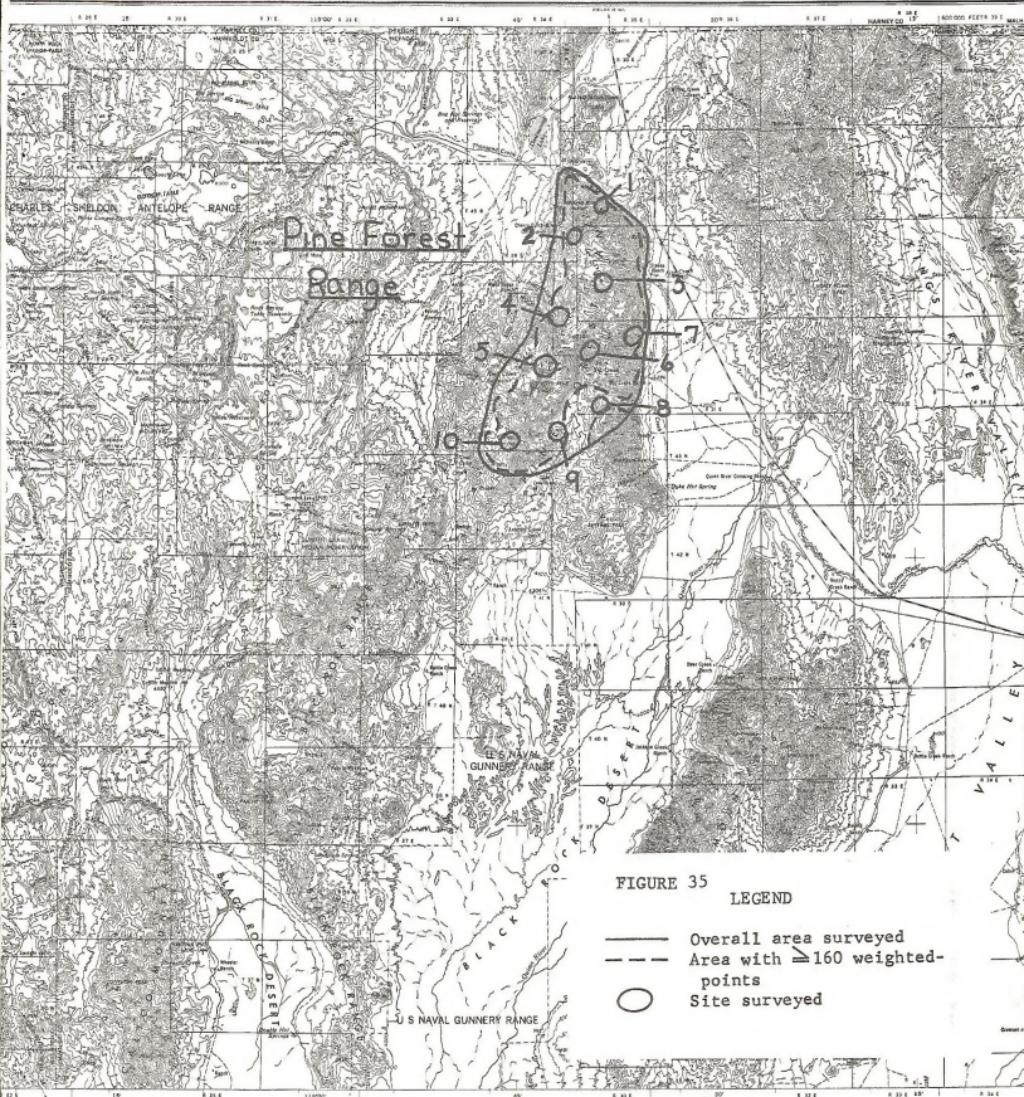


FIGURE 35

## LEGEND

- Overall area surveyed
- - - Area with  $\geq 160$  weighted points
- Site surveyed



PINE FOREST RANGE



FIGURE 36. Steep and rocky terrain broken frequently by canyons of varying widths - north of Fisher Peak.



FIGURE 37. Steep terrain broken by canyons and rolling hills. North Fork Big Creek.

TABLE 23. POTENTIALLY IMPORTANT WATER SOURCES IN THE PINE FOREST RANGE.

WATER SOURCE	KNOWN STATUS	LOCATION
Mosquito Spring	Always present - open flow	T.46N., R.30E., Sec. 30
*Antelope Spring		T.46N., R.30E., Sec. 28
Unnamed Spring		T.46N., R.30E., Sec. 29, 30
Diamond Spring		T.46N., R.30E., Sec. 33
Houghland Spring		T.45N., R.30E., Sec. 4
*Cherry Gulch Spring	Always present - open seep	T.45N., R.30E., Sec. 10, 11
Hillside Spring		T.45N., R.30E., Sec. 7
Unnamed Spring		T.45N., R.30E., Sec. 7
Unnamed Spring		T.44N., R.29E.
Quaking Aspen Spring	Always present - open flow	T.44N., R.29E.
*Unnamed Springs	Always present - open flow	T.45N., R.30E., Sec. 19, 20, 29
Little Alder Spring	Always present - open flow	T.44N., R.29E.
*Little Alder Creek	Always present - open flow	T.44N., R.28E.
Wood Canyon Creek		T.44N., R.29E.
Unnamed Springs		T.44N., R.29E.
Unnamed Springs		T.45N., R.30E., Sec. 29, 30, 31, 32
Boyd Basin Spring		T.44N., R.30E., Sec. 4, 5
Boyd Basin Creek		T.44N., R.30E., Sec. 2, 3, 4
*North Fork Willow Creek	Always present - open flow	T.44N., R.30E., Sec. 4
Willow Creek		T.44N., R.30E., Sec. 3, 4, 8, 9, 10
Unnamed Springs		T.44N., R.30E., Sec. 4
Short Creek		T.44N., R.30E., Sec. 9, 15, 16
*North Fork Big Creek	Always present - open flow	T.44N., R.30E., Sec. 7, 17, 20, 21
*Unnamed Springs	Always present - open seep	T.44N., R.30E., Sec. 8, 17
Big Creek		T.44N., R.30E., Sec. 19, 20, 21, 22
Unnamed Springs		T.43N., R.29E.
Cold Spring		T.43N., R.29E.
South Fork Big Creek	Always present	T.43N., R.28E.
*Blue Lake		T.43N., R.28E.
Outlaw Meadow		T.43N., R.28E.
Alder Creek		T.43N., R.28E.
Hidden Meadow		T.43N., R.28E.
Leonard Creek Basin		T.43N., R.28E.
Leonard Creek Lake		T.43N., R.28E.
*Leonard Creek	Always present - open flow	T.43N., R.28 & 29E.

TABLE 23. POTENTIALLY IMPORTANT WATER SOURCES IN THE PINE FOREST RANGE.

WATER SOURCE	KNOWN STATUS	LOCATION
North Fork Snow Creek		T.43N., R.28E.
Snow Creek		T.42N., R.28E., Sec. 1, 2
		T.43N., R.28E.
Knott Creek		T.43N., R.28E., Sec. 16
*Chicken Creek	Always present - open flow	T.43N., R.28E.
		T.43N., R.29E., Sec. 30
Unnamed Springs		T.43N., R.28E.
*Pass Creek	Always present - open flow	T.44N., R.30E., Sec. 29-34
*Unnamed Springs	Always present - seep	T.44N., R.30E., Sec. 32
*Sage Hen Creek	Always present - open flow	T.42N., R.28E., Sec. 2, 3
Corral Spring		T.42N., R.28E., Sec. 4
Pole Creek		T.43N., R.30E., Sec. 9, 10
Unnamed Springs		T.43N., R.30E., Sec. 8

\*Observed water sources

TABLE 24. PINE FOREST, HABITAT SITE EVALUATION.

SITE	TOPO-GRAPHY	WATER AVAILABILITY				VEGETATION			ANIMAL USE		HUMAN USE			WEIGHT-ED TOTAL (TOTAL X 4)	
		A	B	C	D	A	B	C	A	B	A	B	TOTAL		
1	5	5	5	4	2	4	3	2	3	2	5	5	45	180	
2	5	5	5	4	1	4	2	2	2	2	4	5	41	164	
3	4	5	5	4	2	4	3	3	2	2	5	5	44	176	
4	3 b	5	5	4	2	4	3	3	2	2	5	5	43	172	
5	5	5	5	4	4	3	3	3	4	3	5	5	49	196	
6	4	5	5	5	2	4	3	2	2	3	5	5	45	180	
7	4	5	5	5	2	4	2	2	2	3	5	5	44	176	
8	3 b	5	5	3	1	4	2	2	1	2	5	5	38	152	
9	4	5	5	4	2	4	3	3	2	3	4	5	44	176	
10	4	5	5	5	2	4	3	2	2	3	5	5	45	180	
TOTAL		41	50	50	42	20	39	27	24	22	25	48	50	438	1,752
AVERAGE		4.1	5.0	5.0	4.2	2.0	3.9	2.7	2.4	2.2	2.5	4.8	5.0	43.8	
WEIGHTED-AVERAGE (TOTAL X 4/N)															
16.4	20.0	20.0	16.8	8.0	15.6	10.8	9.6	8.8	10.0	19.2	20.0	175.2			

NOTE: See Appendix A for explanation of values.

#### SELENITE RANGE

On the basis of the information obtained in this evaluation, the Selenite Range (Figure 38) should be considered poor for potential bighorn sheep habitat in its present condition and status. Of the approximately 71 square-miles investigated, about 29 percent or 20 square-miles can be classified as good. This is based on sites with values of 160+ weighted-points and the quality of adjacent habitat (see Appendix B). The overall weighted-average for the twelve sites is 158.3 points, while the five sites in good habitat average 167.2 weighted-points (see Table 25). The best potential areas lie around Selenite Peak and Kumiva Peak and on the east slope of Purgatory Peak and Mt. Limbo (see Figures 39 and 40). A subjective estimate of the expected carrying capacity for these areas was determined to be 3.0 bighorns/square-mile. This estimate would allow for approximately 61 sheep, not considering areas with less than 160 weighted-points (see Appendix C).

The Selenites are placed in the low priority rating primarily on the basis of the negative impacts from livestock grazing in general and domestic sheep grazing in particular (see Appendix D). Bighorn and domestic sheep are not compatible and any future consideration for potential reintroduction of bighorn on this historical range will depend upon resolving this conflict. In addition the range conditions are presently far below desirable levels and site potential. Improvements in water distribution would also help the quality of habitat, (see Table 26).

# LOVELOCK

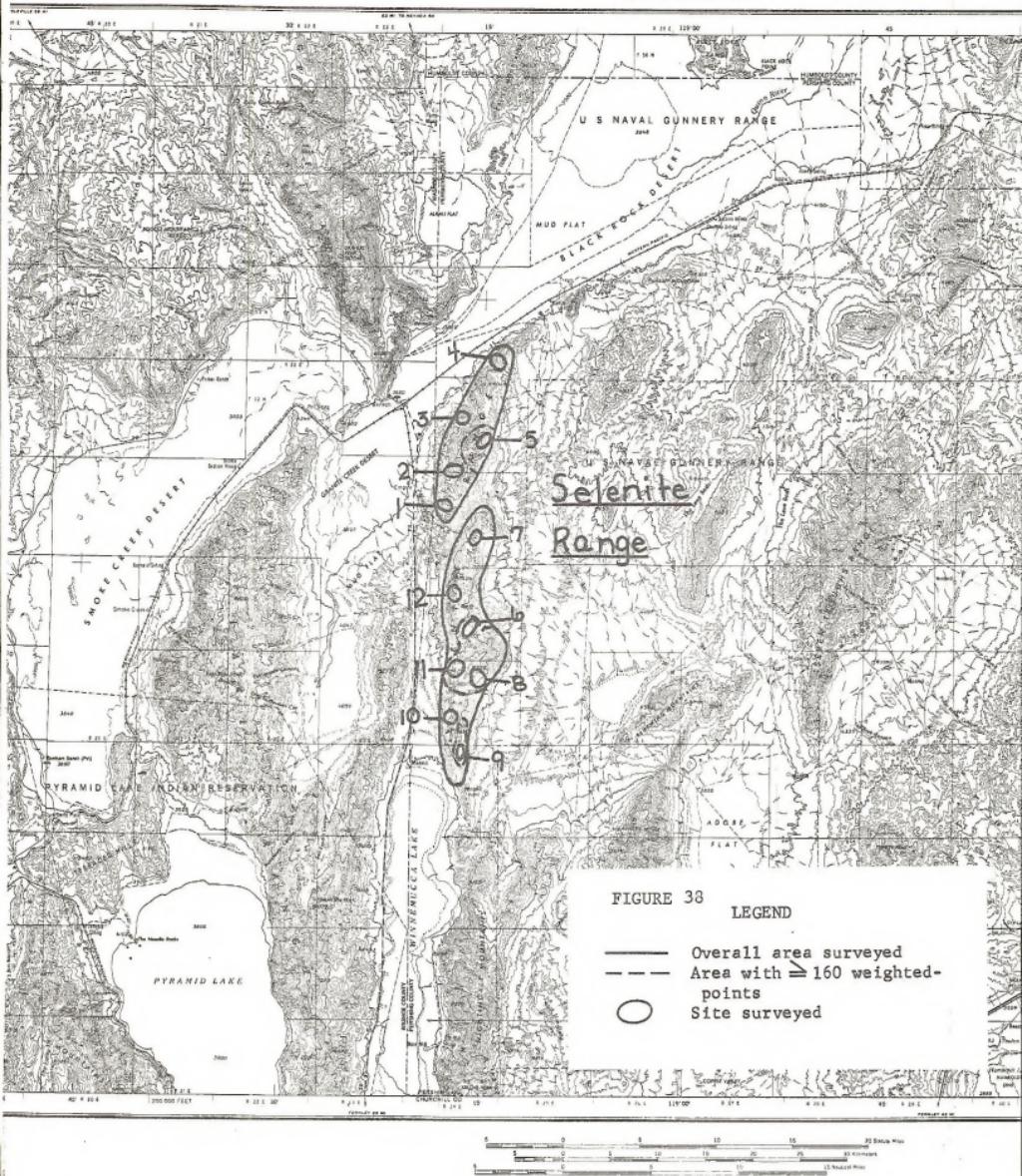


FIGURE 38  
LEGEND

— Overall area surveyed  
- - - Area with  $\geq 160$  weighted-points  
○ Site surveyed

SELENITE RANGE

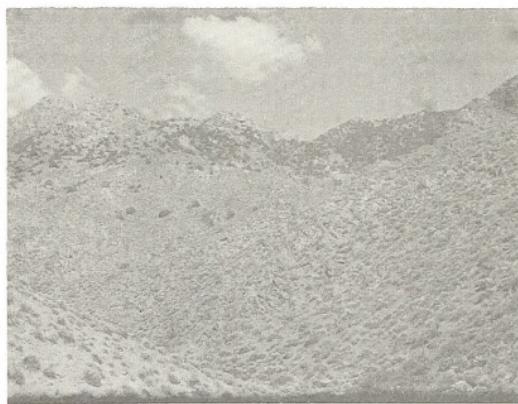


FIGURE 39. Steep and rocky terrain broken frequently by canyons of varying widths - northwest side of Purgatory Peak.

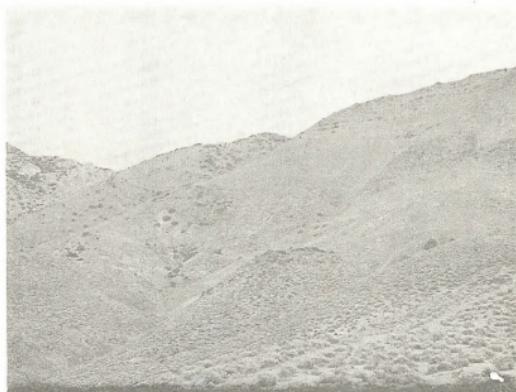


FIGURE 40. Steep and rocky terrain broken by broad canyons and rolling hills - southwest of Selenite Peak.

TABLE 26. POTENTIALLY IMPORTANT WATER SOURCES IN THE SELENITE RANGE.

WATER SOURCE	KNOWN STATUS	LOCATION
*Unnamed Springs	Often dry during dry summers	T.32N., R.22E.
*Unnamed Springs	Often dry during dry summers	T.31N., R.24E.
*Selenite Peak Springs	Always present - open seep	T.32N., R.24E.
*Rocky Point Spring	Seldom dry during summers	T.31N., R.24E.
Texas Basin Spring		T.30N., R.24E.
Last Chance Spring		T.30N., R.24E.
Double Spout Spring		T.30N., R.24E.
*Unnamed Springs	Seldom dry during summers	T.30N., R.24E.
*Trail Canyon Spring	Seldom dry during summers	T.30N., R.24E.
*Kumiva Peak Springs	Always present - open seep	T.29N., R.24E.
*Unnamed Springs	May be dry during dry summers	T.29N., R.24E.
*Mt. Limbo Springs	Dry half of dry summers	T.28N., R.24E., Sec. 3, 4, 9, 10

\*Observed water sources



TABLE 25. SELENITE RANGE, HABITAT SITE EVALUATION.

SITE	TOPOGRAPHY	WATER AVAILABILITY				VEGETATION			ANIMAL USE		HUMAN USE		TOTAL (TOTAL X 4)	WEIGHTED TOTAL	
		A	B	C	D	A	B	C	A	B	A	B			
1	3 b	5	2	3	1	4	2	2	1	3	5	5	36	144	
2	4	5	3	4	1	4	2	1	1	3	5	5	38	152	
3	3 b	5	2	3	1	4	2	2	1	3	5	5	36	144	
4	5	5	2	5	1	4	2	1	1	3	5	5	39	156	
5	4	5	5	5	1	4	3	2	1	3	5	5	43	172	
6	5	5	4	5	1	4	3	3	1	2	3	5	41	164	
7	4	5	4	4	1	4	2	2	1	3	4	5	39	156	
8	5	5	5	4	1	4	3	3	1	3	5	5	44	176	
9	5	5	3	5	1	4	2	2	1	3	5	5	41	164	
10	5	5	3	5	1	4	1	1	1	3	5	5	39	156	
11	5	5	4	5	1	4	1	1	1	3	5	5	40	160	
12	4	5	4	4	1	4	1	2	1	3	5	5	39	156	
<b>TOTAL</b>		52	60	41	52	12	48	24	22	12	35	57	60	475	1,900
<b>AVERAGE</b>		4.3	5.0	3.4	4.3	1.0	4.0	2.0	1.8	1.0	2.9	4.8	5.0	39.6	
<b>WEIGHTED-AVERAGE (TOTAL X 4/N)</b>		17.3	20.0	13.7	17.3	4.0	16.0	8.0	7.3	4.0	11.7	19.0	20.0	158.3	

NOTE: See Appendix A for explanation of values.

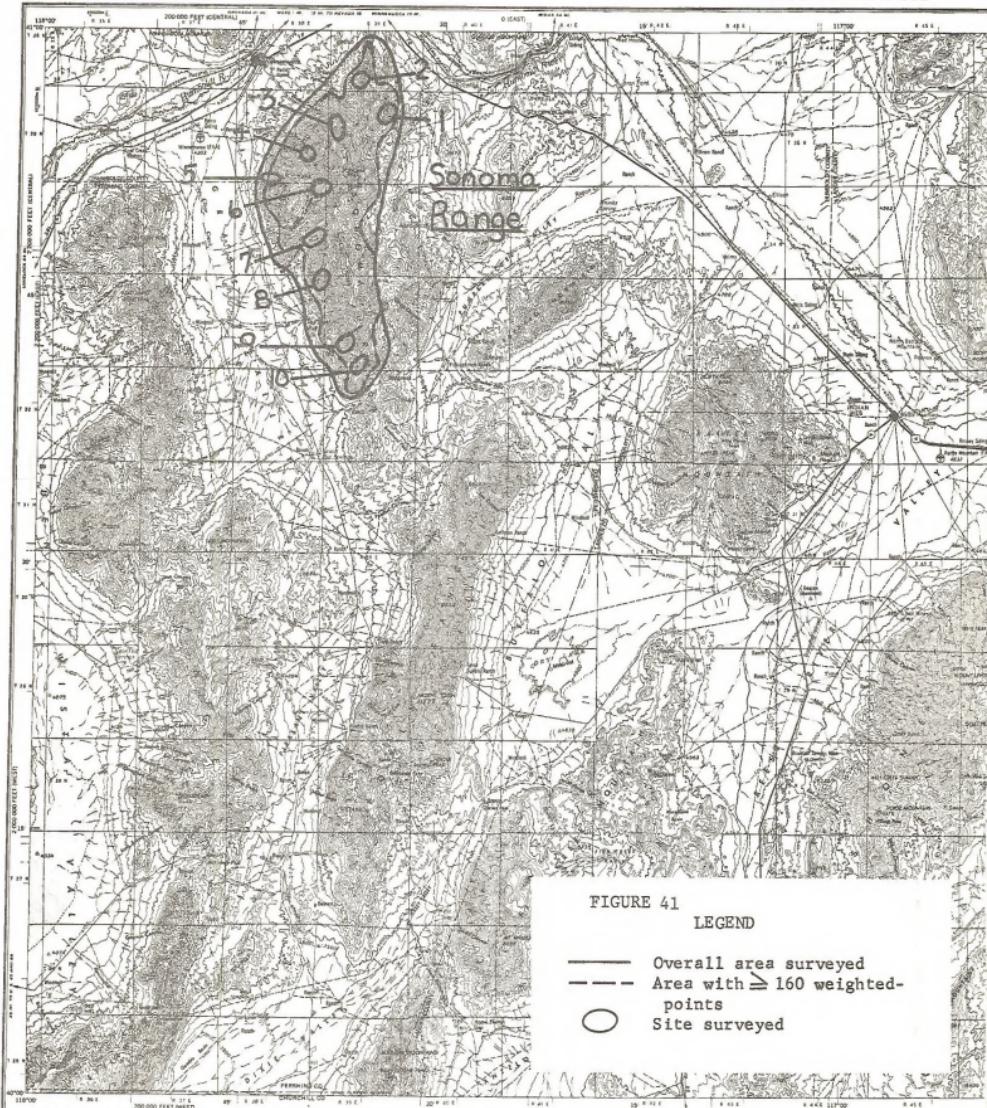
#### SONOMA RANGE

The Sonoma Range (see Figure 41) is considered potentially good habitat for bighorn sheep. The topographic features are adequate (see Figure 42 and 43). Water is well distributed and available during the critical seasons (see Table 27).

From approximately 131 square miles investigated, about 73 percent or 98 square miles can be classified as good habitat. This is based on sites with values of 160+ weighted points (see Appendix B). The overall weighted average for the 10 sites surveyed is 169.6 points, and these sites were all in good to excellent habitat (see Table 28).

A subjective estimate of the expected carrying capacity for this area was determined to be 3.0 bighorns/square mile. This estimate would allow for approximately 295 sheep, (see Appendix C). The Sonoma Range exhibits some good overall habitat qualities, however, the area is not without some significant negative factors. The impacts of livestock grazing are quite obvious throughout the range and improvements need to be made. The fact that domestic sheep are grazed on the east side of the range may present serious problems. Landownership is complicated by alternate sections of private and public lands. Administration of these lands may, therefore, present some difficulties in realizing a bighorn sheep introduction.

It is concluded for this preliminary analysis that the Sonoma range, although compiling a fairly high numerical rating, should be placed in a low priority rating.



SONOMA RANGE

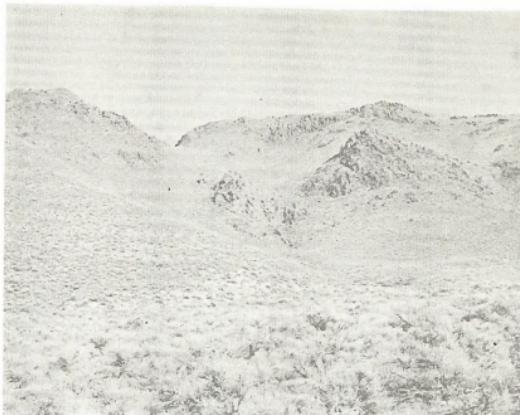


FIGURE 42. Steep and rocky terrain broken frequently by canyons of varying widths - north end of range.

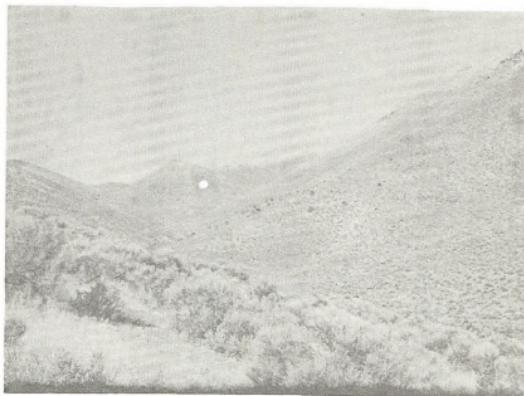


FIGURE 43. Steep and rocky terrain broken by canyons and rolling hills. Washoe Canyon.

TABLE 27. POTENTIALLY IMPORTANT WATER SOURCES IN THE SONOMA RANGE.

WATER SOURCE	KNOWN STATUS	LOCATION
*Unnamed Springs	Seldom dry during summer	T.36N., R.39E., Sec. 29, 32
Harmony Canyon Creek		T.35N., R.39E., Sec. 5, 6, 8, 17
Harmony Canyon Springs		T.35N., R.39E., Sec. 6, 7, 17
*Devils Canyon Springs	Always present - open seep	T.35N., R.39E., Sec. 9, 10, 11, 15, 16
*Water Canyon Creek	Always present - open flow	T.35N., R.38E., Sec. 12
*Water Canyon Springs	Always present - open seep	T.35N., R.39E., Sec. 17, 18
West Fork Pole Creek		T.35N., R.38E., Sec. 13
West Fork Pole Creek Springs		T.35N., R.39E., Sec. 18, 19
East Fork Pole Creek		T.35N., R.39E., Sec. 15, 16, 21, 28
East Fork Pole Creek Springs		T.35N., R.39E., Sec. 16, 17, 20, 29
*Thomas Creek	Always present - open flow	T.35N., R.39E., Sec. 27, 28
Dry Canyon Spring		T.35N., R.38E., Sec. 23, 25, 26
*Unnamed Spring	Dry half of dry summers	T.35N., R.38E., Sec. 27, 34
Sonoma Peak Spring		T.35N., R.38E., Sec. 33
Sonoma Lake		T.34N., R.39E., Sec. 4
Sonoma Lake Springs		T.34N., R.39E., Sec. 3
Mullen Canyon Spring		T.34N., R.39E., Sec. 3, 10
*Sonoma Canyon Creek	Always present - open flow	T.34N., R.38E., Sec. 3, 4
*Sonoma Canyon Springs	Always present - open seep	T.34N., R.38E., Sec. 1, 2, 11, 14, 15
*Elbow Canyon Creek	Always present - open flow	T.34N., R.38E., Sec. 1, 2, 12, 15
*Elbow Canyon Springs	Always present - open seep	T.34N., R.38E., Sec. 23, 24, 26, 27
Willow Springs		T.34N., R.38E., Sec. 13, 14, 24, 27
*Bacon Canyon Springs	Seldom dry during summers	T.34N., R.38E., Sec. 25, 36
Clear Creek		T.33N., R.38E., Sec. 1
		T.34N., R.39E., Sec. 20, 21, 28, 29, 32, 33
Clear Creek Springs		T.33N., R.39E., Sec. 8, 9, 15, 16, 17, 18
		T.34N., R.39E., Sec. 9, 16, 17, 21, 27, 31, 32

TABLE 27. POTENTIALLY IMPORTANT WATER SOURCES IN THE SONOMA RANGE.

WATER SOURCE	KNOWN STATUS	LOCATION
Buckbrush Spring		T.33N., R.39E., Sec. 20, 21
Spanish Basin Springs		T.33N., R.39E., Sec. 22, 27
*Grand Trunk Springs	Always present - open seep	T.33N., R.39E., Sec. 20, 29, 30, 32
*Washoke Canyon Springs	Seldom dry during dry summers	T.32N., R.39E., Sec. 33 T.32N., R.39E., Sec. 4, 5

\*Observed water sources

TABLE 28. SONOMA RANGE, HABITAT SITE EVALUATION.

SITE	TOPO-GRAPHY	WATER AVAILABILITY				VEGETATION			ANIMAL USE		HUMAN USE		TOTAL (TOTAL X 4)	WEIGHT- ED TOTAL	
		A	B	C	D	A	B	C	A	B	A	B			
1	5	5	5	5	1	4	3	3	1	3	4	5	44	176	
2	5	5	4	5	1	4	2	2	1	3	4	5	41	164	
3	4	5	5	4	1	4	3	3	1	3	4	5	42	168	
4	4	5	5	4	2	4	3	3	2	3	5	5	45	180	
5	5	5	3	5	2	4	3	2	2	3	5	5	44	176	
6	4	5	5	5	1	4	3	2	1	3	5	5	43	172	
7	4	5	5	4	1	4	2	3	1	3	5	5	42	168	
8	4	5	4	4	1	4	2	3	1	3	5	5	41	164	
9	3 b	5	5	4	1	4	3	3	1	3	5	5	42	168	
10	4	5	4	4	1	4	2	2	1	3	5	5	40	160	
TOTAL		42	50	45	44	12	40	26	26	12	30	47	50	424	1,696
AVERAGE		4.2	5.0	4.5	4.4	1.2	4.0	2.6	2.6	1.2	3.0	4.7	5.0	42.4	
WEIGHTED-AVERAGE (TOTAL X 4/N)		16.8	20.0	18.0	17.6	4.8	16.0	10.4	10.4	4.8	12.0	18.8	20.0	169.6	

NOTE: See Appendix A for explanation of values.

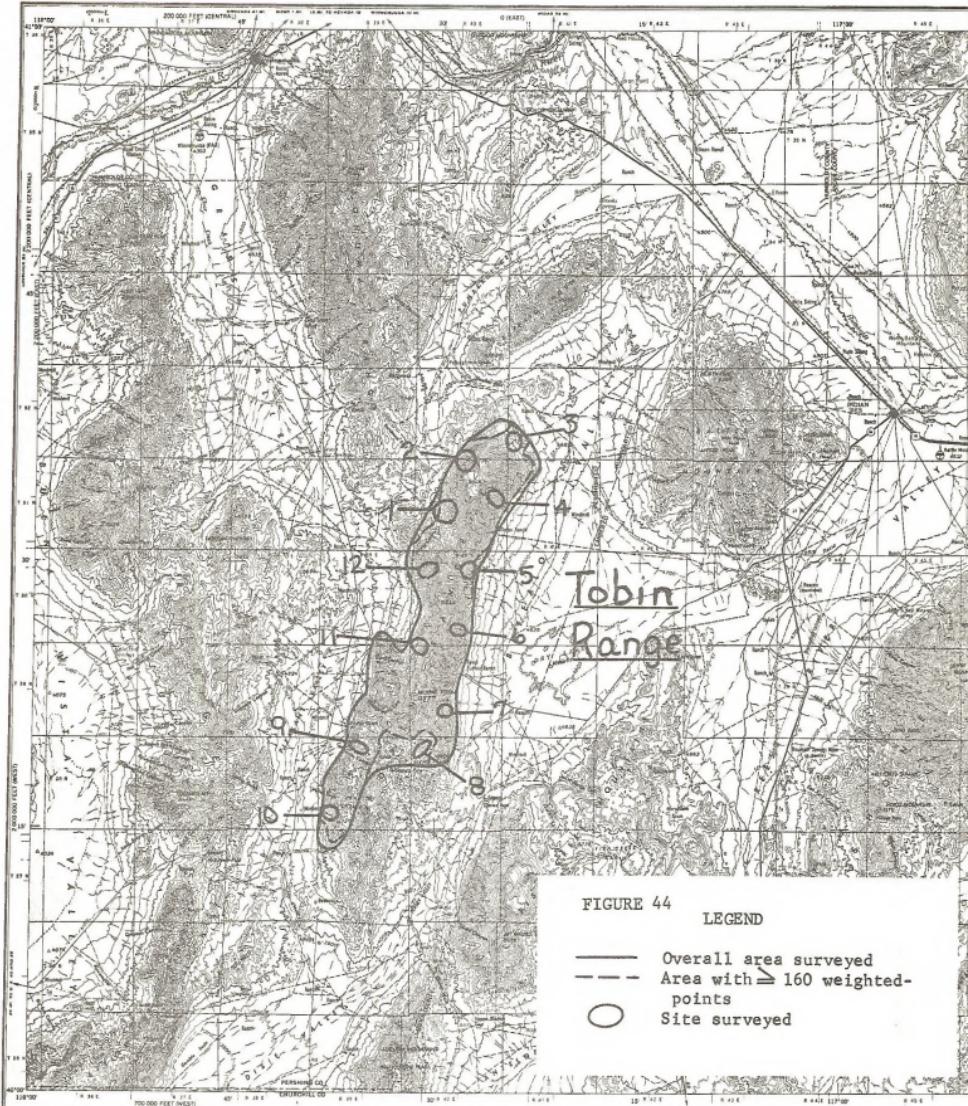
TOBIN RANGE

The Tobin Range (see Figure 44) exhibits some excellent bighorn sheep habitat characteristics. The topographic features are more than adequate (see Figures 45 and 46). Water distribution and availability are considered good, (see Table 29).

A 130 square mile area of the Tobin Range was investigated and as a result about 87 percent or 113 square miles can be classified as good to excellent habitat. This evaluation was based on areas where site values were greater than 160+ weighted points and the quality of adjacent habitat, (see Appendix B). The overall weighted average for the 12 sites surveyed is 167.0 points, while the 11 sites in good to excellent habitat average 168.7 points, (see Table 30). The best potential areas are located in the higher elevations of the range. For these areas, a subjective estimate of the expected carrying capacity was determined to be 3.0 bighorns/square mile. This estimate would allow for approximately 339 sheep (see Appendix C).

The field data analysis indicates a high numerical habitat value for the Tobin Range (see Appendix D) and although the physical features of the range are excellent there are several negative impacts that should carry greater weight in the overall analysis of priority ratings.

The vegetative resources of the range are being heavily utilized by livestock. Some areas are seriously impacted and in general the vegetative condition is far below site potential. The greatest concern is the presence of domestic sheep. This conflict must be resolved prior to any further consideration of the Tobins as a reintroduction site. The numerical rating as shown in Appendix D reflects too high a value, therefore, the adjusted priority rating was selected to show the very serious nature of the existing conflicts.



TOBIN RANGE

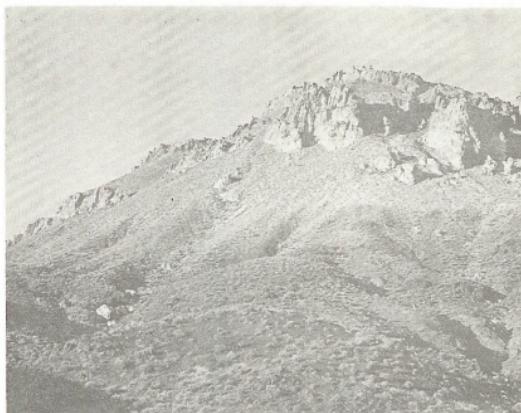


FIGURE 45. Steep and rocky terrain broken by canyons of varying widths.  
Lower Golconda Canyon Area.

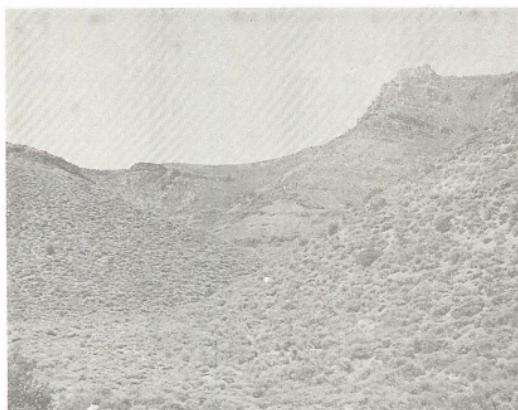


FIGURE 46. Steep and rocky terrain broken by canyons of varying widths.  
Lee Canyon.

TABLE 29. POTENTIALLY IMPORTANT WATER SOURCES IN THE TOBIN RANGE.

WATER SOURCE	KNOWN STATUS	LOCATION
*Unnamed Springs	Always present - open seep	T.32N., R.41E., Sec. 30, 31
*Unnamed Springs	Always present - open seep	T.32N., R.40E., Sec. 25, 26, 35, 36
*China Creek	Always present - open flow	T.31N., R.40E., Sec. 3
Cherry Creek		T.31N., R.41E., Sec. 6, 7, 8
Unnamed Springs		T.31N., R.40E., Sec. 1, 2, 12
Garden Canyon Springs		T.31N., R.40E., Sec. 9, 10, 16
*Lee Canyon	Always present - open seep	T.31N., R.40E., Sec. 11, 13, 14
*Unnamed Springs	Always present - open seep	T.31N., R.40E., Sec. 16, 21
Hoffman Canyon Springs		T.31N., R.40E., Sec. 15, 22, 26, 27, 28, 29, 30
Pollard Canyon Springs		T.31N., R.40E., Sec. 31, 32, 33
Trail Canyon Springs		T.30N., R.40E., Sec. 3
*Flag Canyon Springs	Always present - open flow	T.30N., R.40E., Sec. 3, 4, 10
North Hog Canyon Springs		T.30N., R.40E., Sec. 9, 10, 15
South Hog Canyon Springs		T.30N., R.40E., Sec. 15, 16
Frank Helen Canyon Springs		T.30N., R.40E., Sec. 21, 22
*Morning View Canyon Springs	Always present - open seep	T.30N., R.40E., Sec. 28, 33, 34
Wood Canyon Springs		T.29N., R.40E., Sec. 3, 4, 5
Big Creek Springs		T.29N., R.40E., Sec. 8, 9
North Indian Creek		T.29N., R.40E., Sec. 16, 17
Indian Creek Springs		T.29N., R.40E., Sec. 20, 21
*Unnamed Spring	Always present - open seep	T.29N., R.40E., Sec. 28
Blue Lead Canyon Springs		T.29N., R.40E., Sec. 32, 33
*Jim Creek Springs	Always present - open flow	T.30N., R.40E., Sec. 5, 7, 8, 17, 18, 20, 29
Unnamed Springs		T.30N., R.40E., Sec. 30, 31
Summit Spring		T.30N., R.40E., Sec. 32
*Unnamed Spring	Always present - open flow	T.29N., R.40E., Sec. 6
Shell Canyon Springs		T.29N., R.39E., Sec. 1, 2, 12
Siard Canyon Springs		T.29N., R.39E., Sec. 10, 11, 12
Upper Cottonwood Spring		T.29N., R.39E., Sec. 23
Lower Cottonwood Spring		T.29N., R.39E., Sec. 23

TABLE 29. POTENTIALLY IMPORTANT WATER SOURCES IN THE TOBIN RANGE.

WATER SOURCE	KNOWN STATUS	LOCATION
Spring Creek		T.29N., R.39E., Sec. 26, 27, 34
Unnamed Springs		T.29N., R.39E., Sec. 36
*Unnamed Springs		T.28N., R.40E., Sec. 6, 7
*Unnamed Springs		T.28N., R.39E., Sec. 1
*Unnamed Springs		T.28N., R.39E., Sec. 9
*Golconda Canyon Creek	Always present - open flow	T.28N., R.39E., Sec. 4, 9, 10, 11
Unnamed Springs	Always present - open seep	T.28N., R.39E., Sec. 16, 17, 20, 21
*Miller Basin Springs	Always present - open flow	T.28N., R.39E., Sec. 29, 30, 32
	Always present - open seep	

\*Observed water sources

TABLE 30. TOBIN RANGE, HABITAT USE EVALUATION.

SITE	TOPO-GRAPHY	WATER AVAILABILITY				VEGETATION			ANIMAL USE		HUMAN USE		TOTAL (TOTAL X 4)		
		A	B	C	D	A	B	C	A	B	A	B			
1	4	5	5	4	1	4	3	2	1	3	5	5	42	168	
2	5	5	5	5	1	3	3	2	2	3	5	5	44	176	
3	3 b	5	5	5	1	3	2	2	2	3	4	5	40	160	
4	5	5	5	5	2	4	3	2	2	3	5	5	46	184	
5	3 b	5	5	3	1	4	2	2	2	3	5	5	40	160	
6	4	5	5	4	2	3	2	2	2	3	4	4	40	160	
7	4	5	5	4	2	4	2	2	2	3	5	5	43	172	
8	3 b	5	5	3	1	4	1	3	1	3	4	4	37	148	
9	5	5	5	4	1	4	2	1	2	3	4	4	40	160	
10	5	5	5	5	1	3	2	1	2	3	5	5	42	168	
11	4	5	5	4	1	4	2	3	2	3	5	5	43	172	
12	4	5	5	4	2	4	2	3	2	3	5	5	44	176	
TOTAL		49	60	60	50	16	44	26	25	22	36	56	57	501	2,004
AVERAGE		4.1	5.0	5.0	4.2	1.3	3.7	2.2	2.1	1.8	3.0	4.7	4.8	41.8	
WEIGHTED-AVERAGE (TOTAL X 4/N)		16.3	20.0	20.0	16.7	5.3	14.7	8.7	8.3	7.3	12.0	18.7	19.0	167.0	

NOTE: See Appendix A for explanation of values.

#### VIRGINIA RANGE

The Virginia Range (see Figure 47) provides ample topographic relief for bighorn sheep, with the best areas located in the central and southern portions of the Range. Water is well distributed and available during all seasons (see Table 31). The forage is judged to be fair to good, with the best areas at higher elevations in the central portion of the Range.

The Virginia Range is considered good habitat, based on the information obtained in this preliminary evaluation. Of the approximately 112 square-miles investigated, about 49 percent or 55 square-miles can be classified as good to excellent. This is based on sites with values of 160+ weighted-points and the quality of adjacent habitat (see Appendix B). The overall weighted-average for the 12 sites surveyed is 171.0 points, while the seven sites in good to excellent habitat average 174.3 weighted-points (see Table 32). The best potential areas are located in central, and southern portions of the range (see Figures 48 and 49). For these areas, a subjective estimate of the expected carrying capacity was determined to be 3.5 bighorns/square-mile. This estimate would allow for approximately 193 sheep, not considering areas with less than 160 weighted-points (see Appendix C).

One of the major problems is the large amount of preferred habitat located on the Pyramid Lake Indian Reservation. Since this area is outside Federal jurisdiction, bighorn reintroductions will require coordination with responsible agencies. The impacts of livestock grazing particularly in the northern and western areas of the range need to be adjusted to alleviate adverse impacts.

Although the Virgin Range scored well in the physical evaluation, the deficiencies, especially in the present range conditions on key potential bighorn sites and the adjacent land ownership problems resulted in the overall adjusted priority rating of 9.

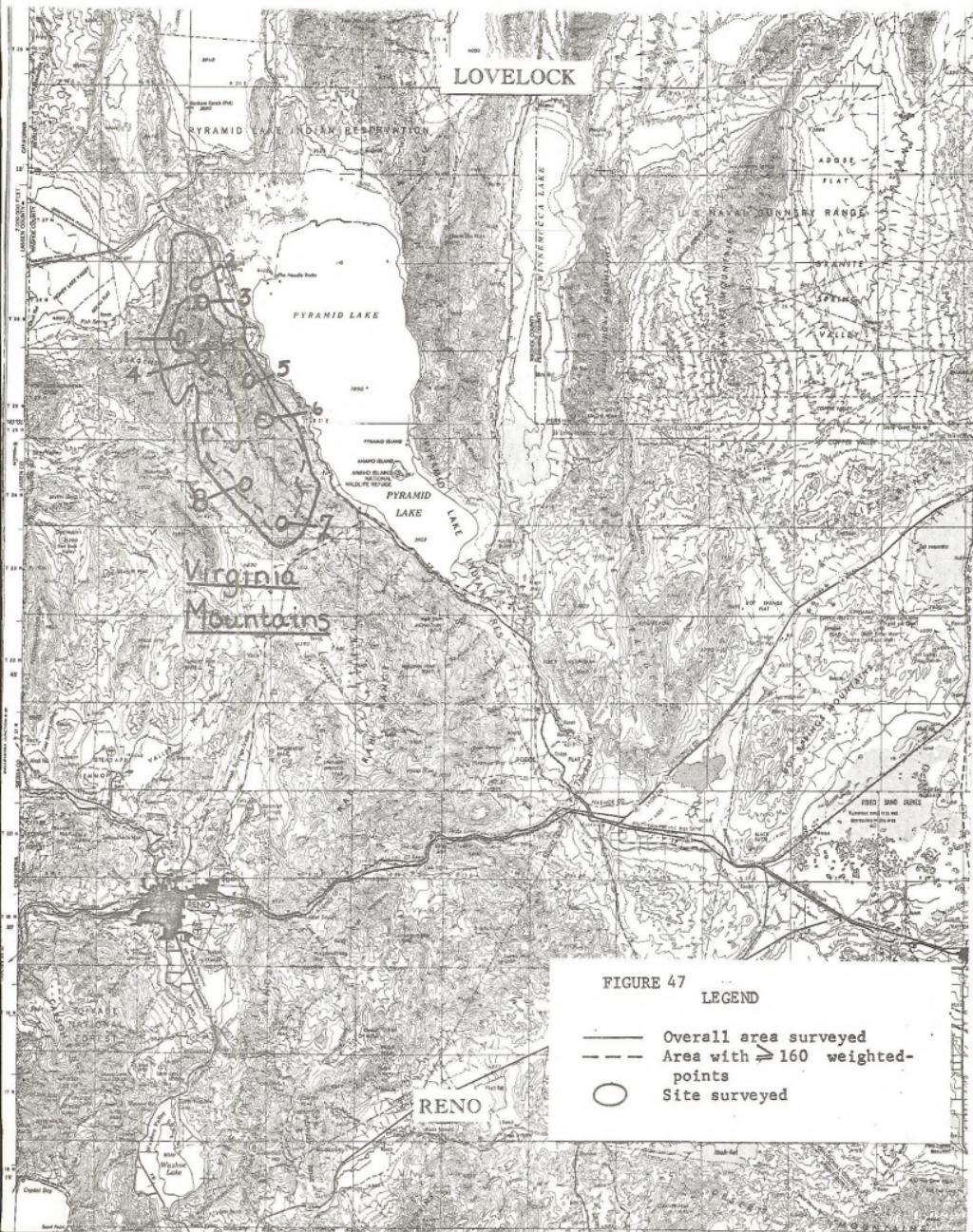


FIGURE 47  
LEGEND

— Overall area surveyed  
- - - Area with  $\geq 160$  weighted points  
○ Site surveyed

VIRGINIA RANGE

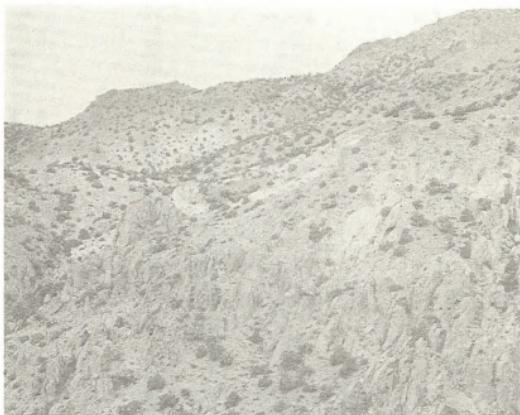


FIGURE 48. Steep and rocky terrain broken frequently by canyons of varying widths - Needle Rock Area.



FIGURE 49. Steep and rocky terrain broken frequently by broad canyons and rolling hills - East Cottonwood Canyon.

TABLE 31. POTENTIALLY IMPORTANT WATER SOURCES IN THE VIRGINIA MOUNTAINS.

WATER SOURCE	KNOWN STATUS	LOCATION
Unnamed Springs		T.27N., R.19E., Sec. 25, 36
Unnamed Springs		T.27N., R.20E., Sec. 30, 31
Unnamed Springs		T.26N., R.20E., Sec. 5, 6
Juniper Basin Springs		T.26N., R.19E., Sec. 1, 12
*Adobe Springs	Always present - open flow	T.26N., R.20E., Sec. 7, 8, 17, 18
*Unnamed Springs	Always present - open seep	T.26N., R.20E., Sec. 19, 20, 29, 30
Telephone Pole Canyon Springs	Always present - open flow	T.26N., R.19E., Sec. 23, 24
*East Cottonwood Canyon	Always present - open flow	T.26N., R.19E., Sec. 25, 26
Cottonwood Creek Springs		T.25N., R.19E., Sec. 2, 11
Cold Spring		T.25N., R.19E., Sec. 11
Salt Cabin Spring		T.25N., R.19E., Sec. 1
*Big Canyon Springs	Always present - open seep	T.26N., R.20E., Sec. 31, 32
Scott Springs		T.25N., R.20E., Sec. 5, 6
Unnamed Springs		T.25N., R.20E., Sec. 20
Barrel Spring		T.26N., R.20E., Sec. 21, 22, 28
Left Hand Canyon Spring		T.26N., R.20E., Sec. 34
Poison Canyon Spring		T.25N., R.20E., Sec. 4
Right Hand Canyon Creek		T.25N., R.20E., Sec. 3
*Jigger Bob Canyon Springs	Always present - open seep	T.25N., R.20E., Sec. 9
Hornet Spring		T.25N., R.20E., Sec. 10, 11, 14
Wood Canyon Creek		T.25N., R.20E., Sec. 15
Unnamed Springs		T.25N., R.20E., Sec. 23, 24, 25, 26
*Water Hole Canyon Creek	Always present - open flow	T.25N., R.20E., Sec. 21, 22, 23, 26, 27, 28
Unnamed Springs		T.25N., R.20E., Sec. 25, 36
Unnamed Springs		T.25N., R.21E., Sec. 30
Unnamed Creek		T.25N., R.21E., Sec. 29, 31, 32
*Hardscrabble Creek Springs	Always present - open seep	T.25N., R.20E., Sec. 34, 35
Cove Springs		T.24N., R.21E., Sec. 5, 6, 8
		T.24N., R.20E., Sec. 12, 13
		T.24N., R.21E., Sec. 18, 19
		T.24N., R.20E., Sec. 9, 16

TABLE 31. POTENTIALLY IMPORTANT WATER SOURCES IN THE VIRGINIA MOUNTAINS.

WATER SOURCE	KNOWN STATUS	LOCATION
Pradere Spring		T.24N., R.20E., Sec. 27
*Piute Canyon Springs	Always present - open seep	T.24N., R.20E., Sec. 14, 22, 23, 26, 27
*Unnamed Springs	May be dry during dry summers	T.24N., R.21E., Sec. 29
Unnamed Springs		T.24N., R.20E., Sec. 25, 36
Unnamed Springs		T.23N., R.21E., Sec. 5, 6

\*Observed water sources

TABLE 32. VIRGINIA MOUNTAINS, HABITAT SITE EVALUATION.

SITE	TOPO-GRAPHY	WATER AVAILABILITY				VEGETATION			ANIMAL USE		HUMAN USE		TOTAL (TOTAL X 4)	
		A	B	C	D	A	B	C	A	B	A	B		
1	4	5	5	4	1	3	3	3	1	3	5	5	42	168
2	3 b	5	5	2	1	4	2	2	1	2	5	5	37	148
3	5	5	5	4	1	4	2	3	1	2	5	5	42	168
4	5	5	5	4	2	4	3	3	2	3	5	5	46	184
5	4	5	5	4	2	4	3	3	2	3	5	5	45	180
6	5	5	5	5	2	4	3	3	2	3	5	5	47	188
7	5	5	3	5	2	3	2	1	3	3	4	4	40	160
8	5	5	5	5	2	3	2	2	2	3	4	5	43	172
TOTAL		36	40	38	33	13	29	20	20	14	22	38	342	1,378
AVERAGE		4.5	5.0	4.8	4.1	1.6	3.6	2.5	2.5	1.8	2.8	4.8	4.9	42.8
WEIGHTED-AVERAGE (TOTAL X 4/N)														
		18.0	20.0	19.0	16.5	6.5	14.5	10.0	10.0	7.0	11.0	19.0	19.5	171.0

#### OVERALL CONCLUSIONS AND RECOMMENDATIONS

On the basis of the information presented in the individual range reports the numerical ratings arrived at from the sum total of all the habitat values analyzed are listed in highest value order as follows:

1. Pine Forest	(724)	9. Pilot Peak	(388)
2. Tobin	(658)	10. Badlands	(363)
3. Humboldt	(636)	11. Fox	(354)
4. Sonoma	(573)	12. Calico	(339)
5. Goshute	(494)	13. Selenite	(329)
6. Izzenhood	(466)	14. Black Rock	(299)
7. Virginia	(460)	15. Montana	(218)
8. Buffalo Hills	(392)	16. Double H	(189)

The above order of rating probably reflects the overall value of the physical features of the sites analyzed in their present condition, but does not necessarily prioritize the sites for their best potential as a bighorn transplant area based on all known facts. The major difficulty in accomplishing this task was closely associated with the inability to properly weigh, by importance, each factor or combination of factors as to their positive or negative benefits. Consequently, a greater subjective analysis was necessary to finally determine the proper order of priority. Appendix D shows the recommended order of priority for the 16 bighorn transplant sites investigated. The Pine Forest Range was selected as first priority, a decision influenced by a greater proportion of public land involved, the relative large total potential habitat and the highest potential expected sheep population. In addition no serious deficiencies were surfaced during our investigation. The fact that the Pine Forest range also contains a large designated roadless area and has relatively light human impact and little apparent problem of competition with livestock and other wildlife gives further credence to the recommendation that the range be given top priority.

The Tobin, Humboldt, Sonoma, Goshute, Izzenhood, and Selenite Ranges all have domestic sheep grazing occurring within the described potential bighorn habitat or closely adjacent to it. There are serious problems of incompatability between these animals that would jeopardize any attempts to reestablish a viable population of bighorn. For this reason the priority ratings were purposely lowered to allow sufficient time to resolve this major conflict one way or the other.

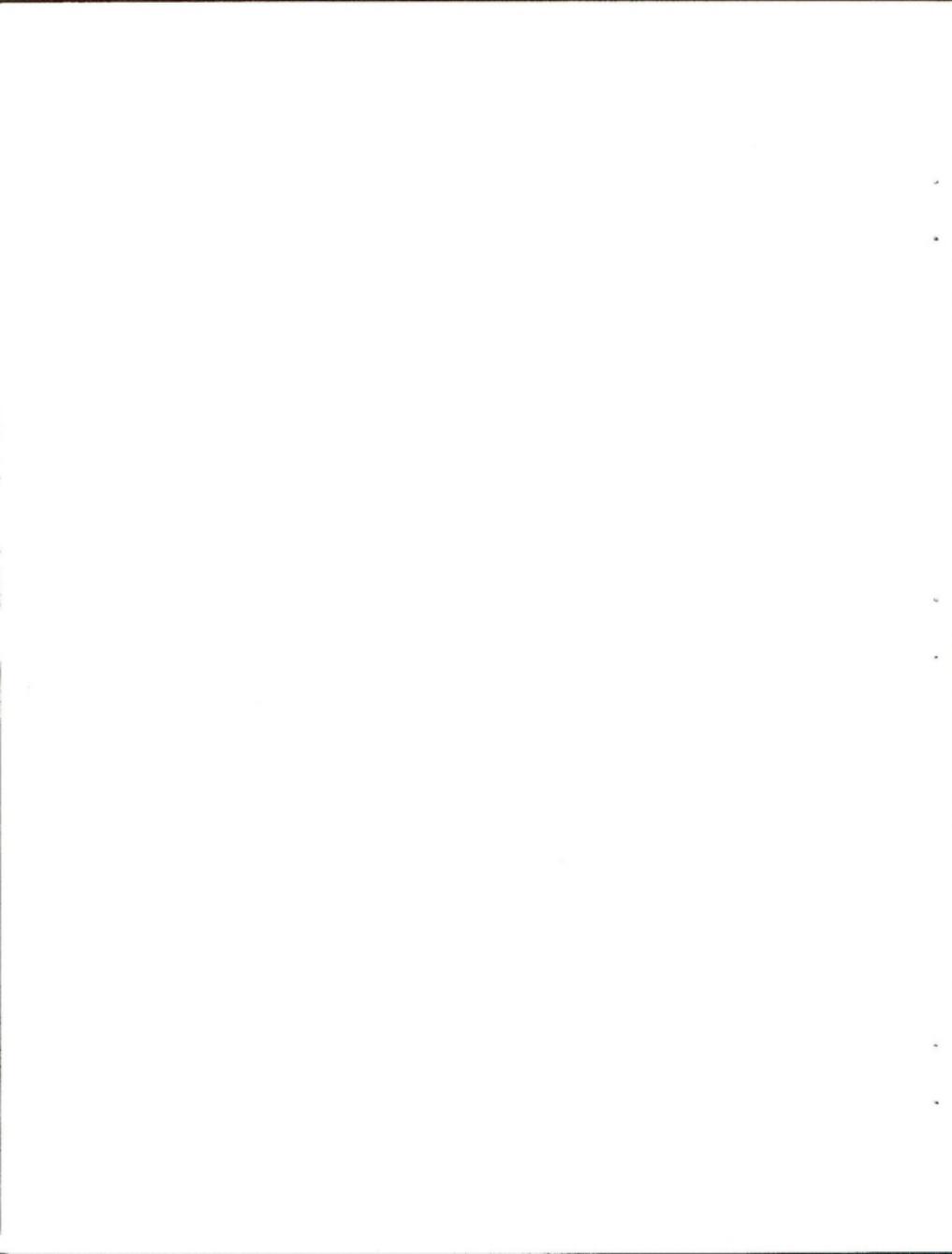
In our analysis only the Goshute Range had a significant negative habitat characteristic that would be very difficult to correct. The dense and widely distributed pinyon-juniper forest may be considered a serious deficiency which is beyond our present capabilities to change.

Perhaps the single deficiency common to practically all of the sites analyzed was the present condition of the range. Detrimental livestock grazing impacts were reflected in the quality and quantity of vegetation in all but the most inaccessible or water deficient areas of the ranges. Fortunately, however, with the application of good range management techniques presently available and the recognized need for improvement, potential bighorn sheep ranges may yet get the break they need. A few ranges are presently in a condition, vegetatively speaking, to receive a transplant of bighorns. Others will take considerable effort and much time to achieve proper range condition.

It is recommended that four additional areas that were not included in the original 16 be evaluated as potential bighorn range. These areas include:

1. McGee mountain along the escarpment from Idaho Canyon to the north end of the mountain.
2. Kings River Range from disaster peak west to Granite Peak.
3. North Black Rock Range from Slum Gullion Canyon to Mahogany Creek.
4. Snowstorm Mountain

It is further recommended that mountain ranges in the middle 1/3 of Nevada be evaluated for their potential as bighorn transplant sites and prioritized in their proper order.



A P P E N D I X



## APPENDIX A

### EVALUATION GUIDE FOR HABITAT COMPONENTS FOR SITES SURVEYED

#### TOPOGRAPHY

	<u>VALUE</u>
Steep and rocky terrain broken frequently by canyons or draws of varying widths with at least one main canyon or draw 500 feet wide more or less and side canyons or draws at various angles for protection from the weather and for escape.	5
Steep and rocky terrain broken frequently by canyons and/or draws (50-90%) and rolling hills.	4
a) Steep and rocky (100%) with no canyons.	
b) Rolling hills broken frequently by broad canyons or draws and within one mile of steep and rocky terrain.	
c) Mesa-type terrain.	3
Rolling hills (such as alluvial fans) without canyons or draws and/or more than one mile from steep and rocky terrain.	2
Level or slightly undulating (100%) within one mile of steep and rocky terrain.	1
Level or slightly undulating (100%) (example: dry lake beds and their margins) that is more than one mile from steep and rocky terrain.	0

#### WATER

##### A. Distribution

1 mile (or less) increments	5
2 mile increments	4
3 mile increments	3
4 mile increments	2
Over 4 mile increments	1

	<u>VALUE</u>
<b>B. <u>Amount and Permanence</u></b>	
Sufficient and always present	5
Seldom dry during the summer	4
Dry half of the time during dry summers	3
Often dry in summer during dry years	2
Water present irregularly, mainly in winter	1
<b>C. <u>Type of Terrain and Obstructions</u></b>	
Open, steep and rocky terrain with a clear view for at least 50 yards	5
Steep and rocky but with some trees or natural or minor obstruction to vision	4
Rolling hills with trees or other natural or minor obstruction to vision	3
Open, rolling hills; surrounded by a corral, etc., that is passable; or about 1/2 mile from steep and rocky terrain	2
Flat land; water surrounded by fences, etc.; steep-sided dam or pothole	1
<b>D. <u>Competition</u></b>	
No sign of native big game use	5
Some native big game use	4
More native big game use than other	3
Some domestic livestock use and some native or feral animal use	2
Frequent livestock use	1

	<u>VALUE</u>
<u>VEGETATION</u>	
<u>A. General Community Types</u>	
Grass/forb	5
Grass/forb/shrub	4
Grass/forb/shrub/trees	3
Grass/trees	2
Shrub/trees	1
Important grasses for California bighorn.	
Bluebunch wheatgrass - <u>Agropyron spicatum</u>	
Idaho fescue - <u>Festuca idahoensis</u>	
Desert needlegrass - <u>Stipa speciosa</u>	
<u>B. Percent Preferred Forage</u>	
High (+80%)	5
Moderately-high (60-80%)	4
Moderate (40-60%)	3
Moderately-low (20-40%)	2
Low (-20%)	1
<u>C. Overall Density</u>	
High (+65% ground cover)	5
Moderately-high (50-65% ground cover)	4
Moderate (35-50% ground cover)	3
Moderately-low (15-35% ground cover)	2
Low (-15% ground cover)	1

	<u>VALUE</u>
<u>ANIMAL USE</u>	
A. <u>Domestic/Feral Utilization</u>	
Light to none	4
Light	3
Light to moderate	2
Moderate to heavy	1
B. <u>Big Game Utilization</u>	
Light to none	4
Light	3
Light to moderate	2
Moderate to heavy	1
<u>HUMAN USE</u>	
A. <u>Roads and Fences</u>	
Less than 5% of the area	5
Less than 10% but more than 5% of the area	4
Less than 15% but more than 10% of the area	3
- Less than 20% but more than 15% of the area	2
More than 20% of the area	1
B. <u>Mineral and Agricultural Development</u>	
Less than 10% of the area	5
Less than 20% but more than 10% of the area	4
Less than 30% but more than 20% of the area	3
Less than 40% but more than 30% of the area	2
More than 40% of the area	1

## APPENDIX B

AREAS OF SURVEYED RANGES - INCLUDING PERCENTAGE OF AREA WITH  
160+ WEIGHTED-POINT VALUE

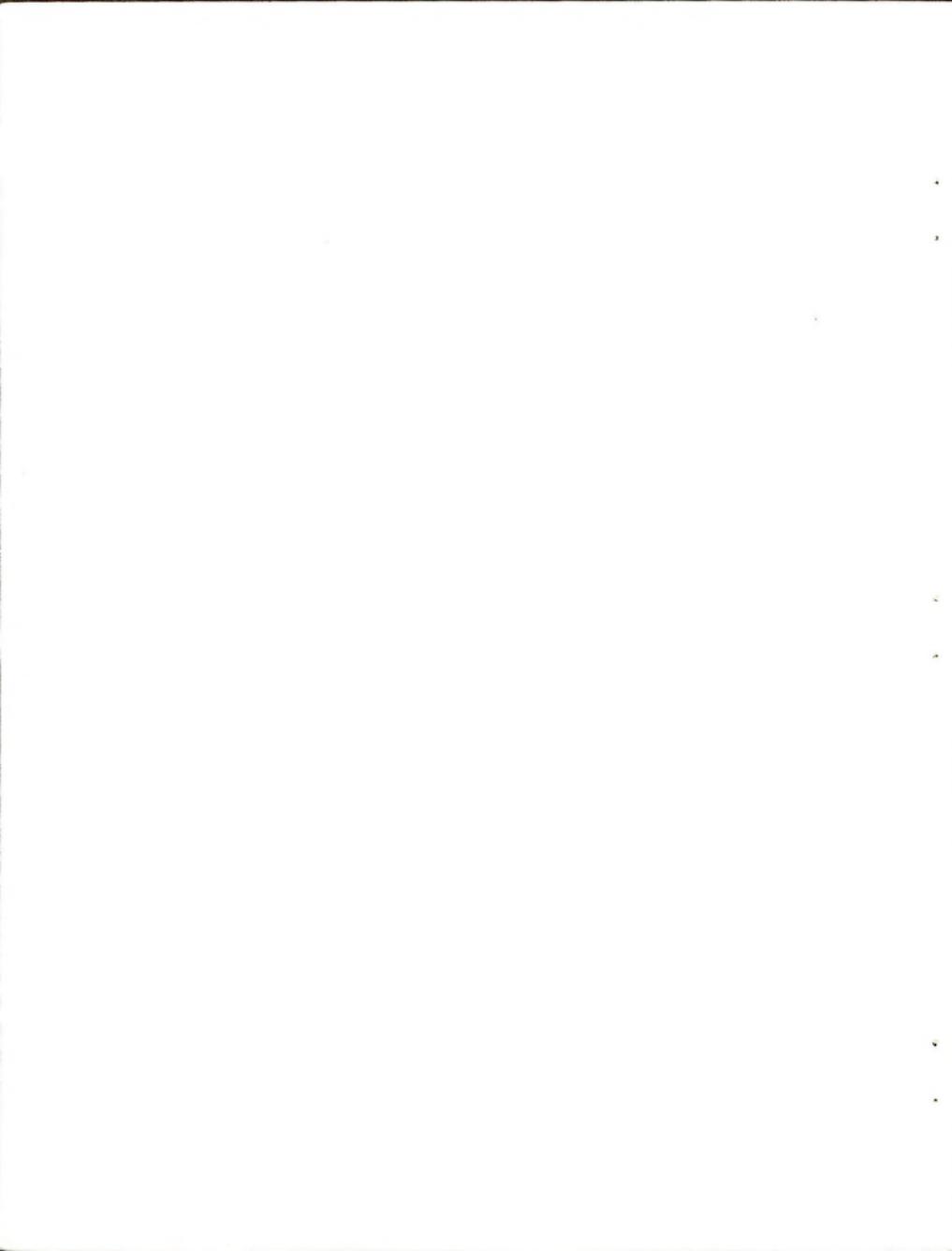
RANGE	(A) TOTAL AREA SURVEYED (MI <sup>2</sup> )	(B) AREA WITH 160+ PTS. (MI <sup>2</sup> )	(B) AS % OF (A)
Badlands	68.5	28.5	42
Black Rock	65.1	19.0	29
Buffalo Hills	100.6	37.2	37
Calico	142.6	28.2	20
Double H	41.3	7.3	18
Fox	140.3	43.9	31
Goshute	178.9	57.9	32
Humboldt	114.9	89.7	78
Izzenhood	110.4	53.9	49
Montana	48.0	14.5	30
Pilot Peak	42.5	31.4	74
Pine Forest	136.7	102.1	75
Selenite	70.5	20.2	29
Sonoma	134.4	98.2	73
Tobin	130.2	113.0	87
Virginia	111.9	55.1	49



## APPENDIX C

EXPECTED BIGHORN SHEEP NUMBERS PER RANGE FOR  
AREAS WITH 160+ WEIGHTED-POINTS

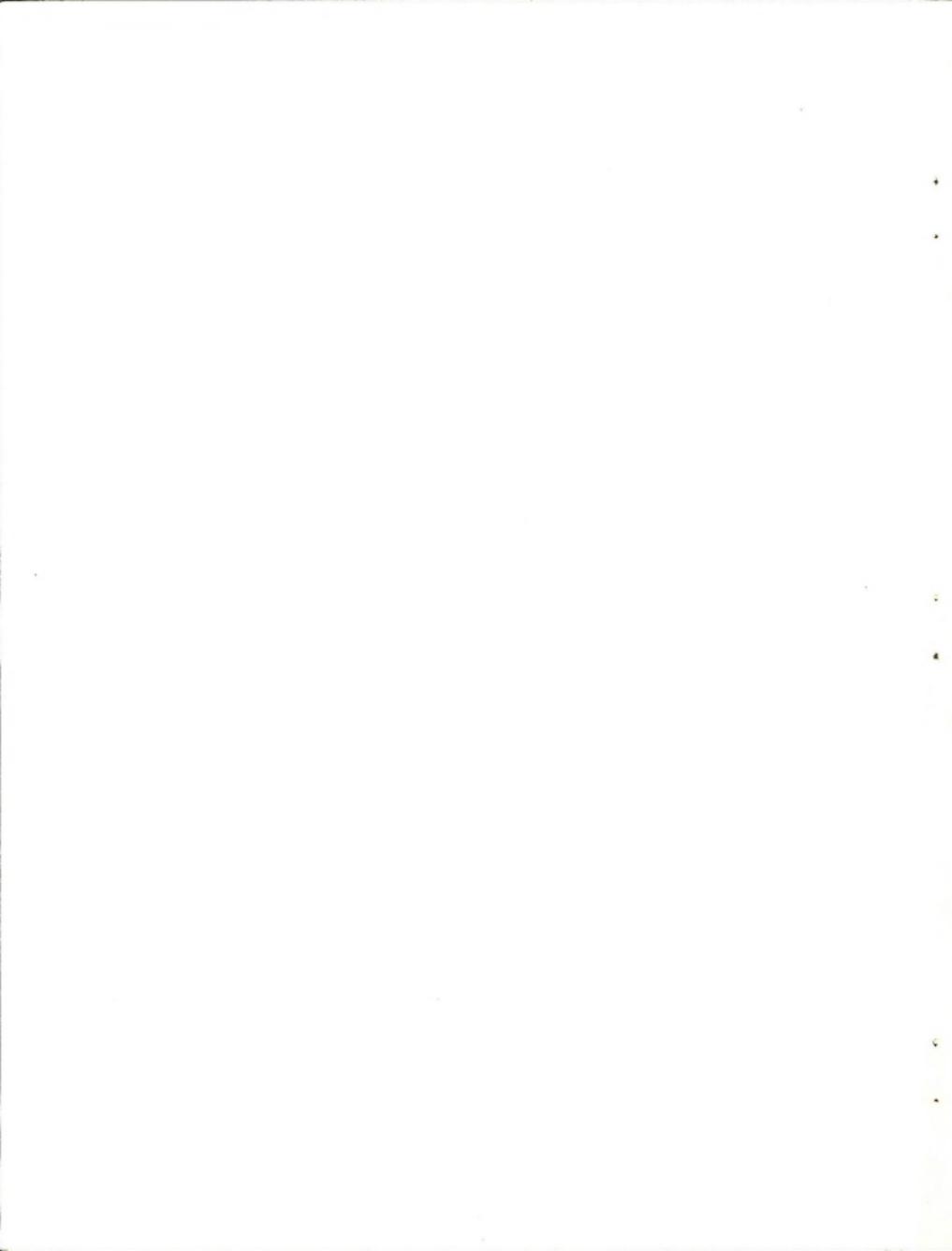
RANGE	MI <sup>2</sup>	(A)	(B)	(C)	
		EXPECTED SHEEP PER MI <sup>2</sup>	EXPECTED SHEEP NO. (AxB=C)	RANGE FOR EXPECTED SHEEP PER MI <sup>2</sup>	RANGE FOR EXPECTED SHEEP NUMBER
Badlands	28.5	3.0	86	2.5 - 3.5	71 - 100
Black Rock	19.0	3.5	67	3.0 - 4.0	57 - 76
Buffalo Hills	37.2	3.0	112	2.5 - 3.5	93 - 130
Calico	28.2	2.5	71	2.0 - 3.0	56 - 85
Double H	7.3	2.5	18	2.0 - 3.0	15 - 22
Fox	43.9	2.5	110	2.0 - 3.0	88 - 132
Goshute	57.9	3.5	203	3.0 - 4.0	174 - 232
Humboldt	89.7	4.0	359	3.5 - 4.5	314 - 404
Izzenhood	53.9	3.5	189	3.0 - 4.0	162 - 216
Montana	14.5	3.0	44	2.5 - 3.5	36 - 51
Pilot Peak	31.4	4.5	141	4.0 - 5.0	126 - 157
Pine Forest	102.1	4.0	408	3.5 - 4.5	357 - 459
Selenite	20.2	3.0	61	2.5 - 3.5	51 - 71
Sonoma	98.2	3.0	295	2.5 - 3.5	246 - 344
Tobin	113.0	3.0	339	2.5 - 3.5	283 - 396
Virginia	55.1	3.5	193	3.0 - 4.0	165 - 220



## APPENDIX D

NUMERICAL VALUES AND ADJUSTED PRIORITY RATINGS  
FOR 16 POTENTIAL BIGHORN SHEEP RANGES

	Topo- graphy	Water	Vege- tation	Animal Use	Human Use	Sq. Mi. of Potential Habitat	Minimum Expected Population	Appro- ximate Public Lands	Total Value	Adjusted Priority Rating
Pine Forest	16.4	64.8	36.0	18.8	39.2	102.1	357.0	90.0	724.3	1
Tobin	16.3	62.0	31.7	19.3	37.7	113.0	283.0	95.0	658.0	11
Humboldt	20.0	68.0	37.7	20.4	37.0	89.7	314.0	50.0	636.8	12
Sonoma	16.8	60.4	36.8	16.8	38.8	98.2	246.0	60.0	573.8	15
Goshute	16.0	58.3	29.8	22.3	36.6	57.9	174.0	99.0	493.9	16
Izzenhood	16.9	57.8	32.8	24.9	37.8	53.9	162.0	80.0	466.1	13
Virginia	18.0	55.5	34.5	18.0	38.5	55.1	165.0	75.0	459.6	9
Buffalo Hills	13.2	58.9	35.4	19.4	40.0	37.2	93.0	95.0	392.1	2
Pilot Peak	20.0	60.7	33.3	26.7	40.0	31.4	126.0	50.0	388.1	3
Badlands	13.0	58.5	37.0	21.0	34.5	28.5	71.0	99.0	362.5	4
Fox	14.8	52.8	30.8	16.4	37.6	43.9	88.0	70.0	354.3	7
Calico	16.0	51.6	31.2	17.2	40.0	28.2	56.0	99.0	339.2	5
Selenite	17.3	55.0	31.3	15.7	39.0	20.2	51.0	99.0	328.5	14
Black Rock	14.4	51.6	29.6	18.8	10.0	19.0	57.0	99.0	299.4	8
Montana	16.9	54.2	37.8	18.3	30.2	14.5	36.0	100.0	217.9	10



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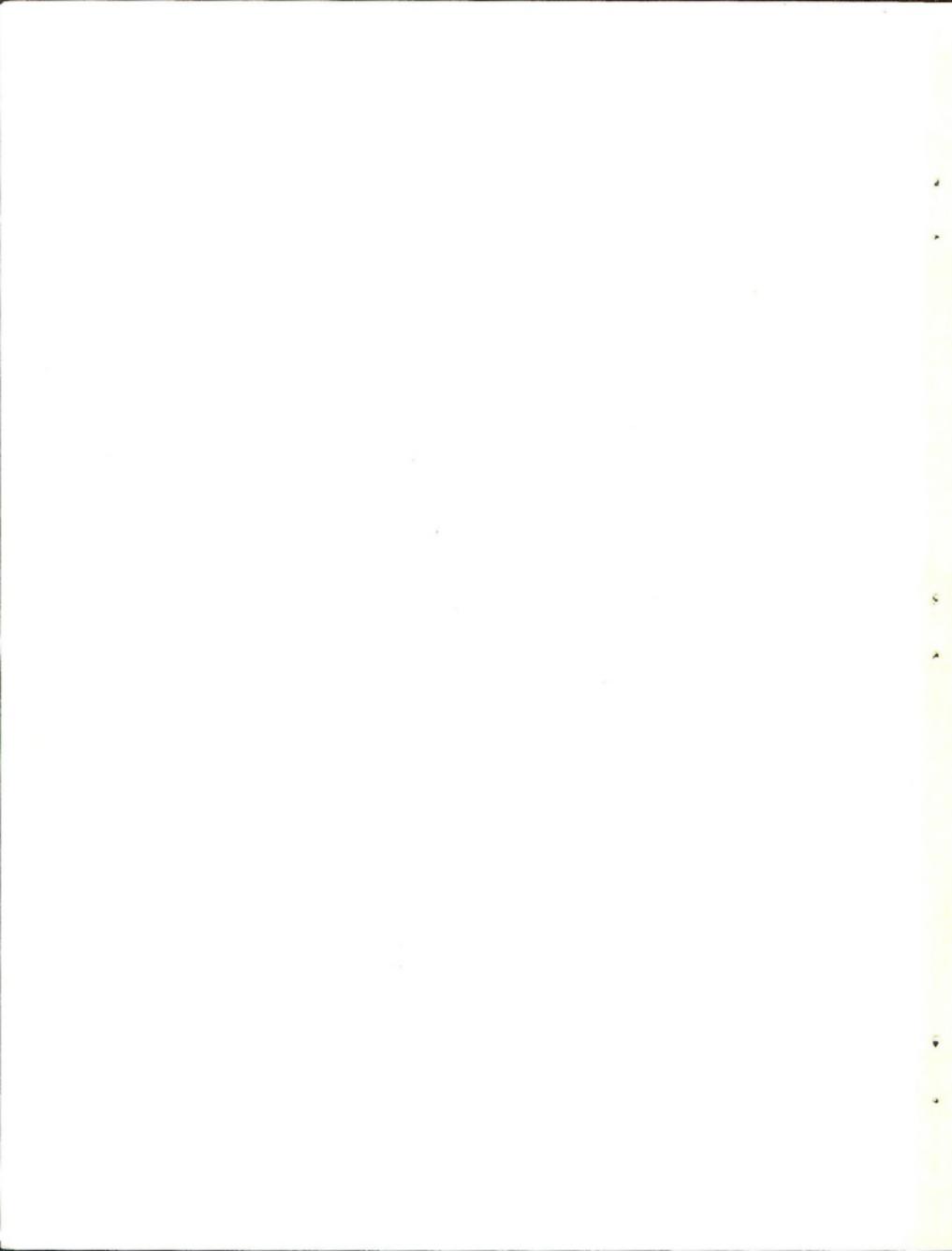
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